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# report

EDUCATION AND EMPLOYMENT  
STATISTICS DIVISION

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## 1985 SALARIES: SOCIETY MEMBERSHIP SURVEY



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1983 Salaries: Society Membership Survey

# **1985 SALARIES: SOCIETY MEMBERSHIP SURVEY**

**W. Keith Skelton, Roman Czujko, and Dawn Kellman**

**The American Physical Society  
Optical Society of America  
Acoustical Society of America  
The Society of Rheology  
American Association of Physics Teachers  
American Crystallographic Association  
American Astronomical Society  
American Association of Physicists in Medicine  
American Vacuum Society  
American Geophysical Union**

## COVER

This figure illustrates the variation in median salaries by state of residence. California and several states in the sunbelt and along the eastern coast maintain the greatest concentration of society members and the highest PhD salaries in the nation. Heavy representation of industry, government, and national laboratories within these states, and the higher salaries associated with such employment, account for the salary distribution found within these areas. States where relatively low salaries are observed (the Plains and Southeastern states) generally have relatively few society members, most of whom are academically employed. Where shading is absent, there are too few society members to report reliable median salaries.

Median salaries for PhD society members resident in the Canadian provinces of Quebec and Ontario in the accompanying figure are presented in Canadian dollars. The salaries in Quebec are lower, partly reflecting the heavier academic composition of the members residing there.



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## INTRODUCTION

Between March 1983 and March 1985 the salaries of society members kept slightly ahead of the national inflation rate.<sup>1</sup> Median salaries for members increased to \$44,100 from the \$40,000 observed in 1983, an average increase of 5.0% per year. PhDs, who make up nearly three quarters of the full-time employed membership, earned a median salary of \$46,000 while individuals with masters or bachelors degrees made approximately \$40,000.

The 1985 survey represents the seventh time that society members have been queried annually for demographic and employment information. Figure 1 illustrates that since 1979 society members have been struggling to keep pace with inflation. Median salaries for all full-time employed society members, adjusted to represent constant 1979 dollars, have increased only 5.1% over this six-year period. The majority of society members, those with doctoral degrees, have fared slightly better with an increase of 7.7%.

These are just a few of the findings derived from the Education and Employment Statistics Division's Membership Sample Survey, conducted in the spring of 1985. This report examines the considerable variation in salary levels and patterns of increase by geographic location, employer, type of work, position, degree level, years from degree, and sex. The data provided are based on a stratified random sample of over one-sixth of the United States and Canadian members. The individuals contacted were all current members of at least one AIP member society as of December 1984.<sup>2</sup> The overall response rate in 1985 was 65%.

The analyses for this report center around the use of median and quartile salaries, which are the preferred descriptive measures of central tendency and variations in typically skewed salary distributions. Mean salaries, standard deviations, and median ages for each group are presented in each table for comparative purposes. See Appendix B for definitions and technical notes on the measures used in this report.

While much of this report will detail the various salary structures found in March 1985, salary changes between 1983 and 1985 will also be examined. Such change can be analyzed in several ways. The most typical comparisons are cross-sectional, e.g., comparing the 1985 median salary of industrially employed PhDs to the median salary of similarly employed individuals in 1983. Cross-sectional analyses, as valuable as they are, reflect net changes; they do not examine the dynamics of salary change. For individual society members or employers seeking data on typical salary increases, they may be misleading. Longitudinal data, which look at the same people at two or more points in time, provide a better picture of these actual increases. In this

MEDIAN SALARY  
(In Thousands of Dollars)

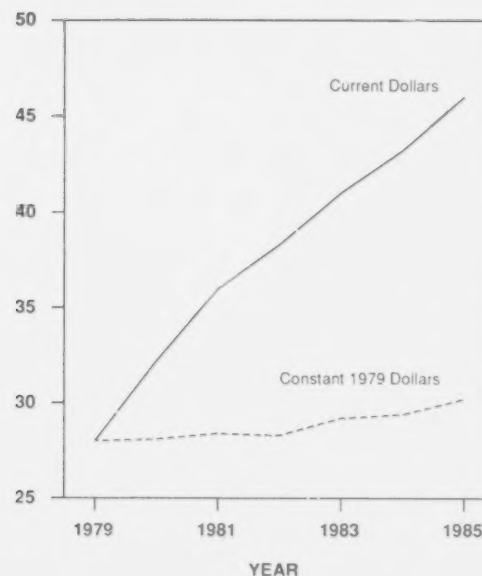


Figure 1. Median salaries for PhDs, 1979–1985. Both reported salaries and salaries adjusted for inflation are presented.

report, we have presented or commented on both types of salary change where possible.

Readers should note that the small number of masters and bachelors in the sample limits the amount of detailed analysis that can be performed. Within this small group, nearly one out of every five masters degree holders work in secondary schools and two thirds of the bachelors are employed in industry. One reason for the limited representation of lower degree holders is that a large proportion of this group are advanced graduate students and thus are not included in traditional salary analyses. Many of the masters and bachelors who are not pursuing advanced degrees are employed as teachers,

<sup>1</sup>Between March 1983 and March 1985 the average rate of inflation, as quoted by the Bureau of Labor Statistics Consumer Price Index Division, was 4.2%.

<sup>2</sup>While the American Geophysical Union is now a member society of AIP, it was not at the time of this survey.

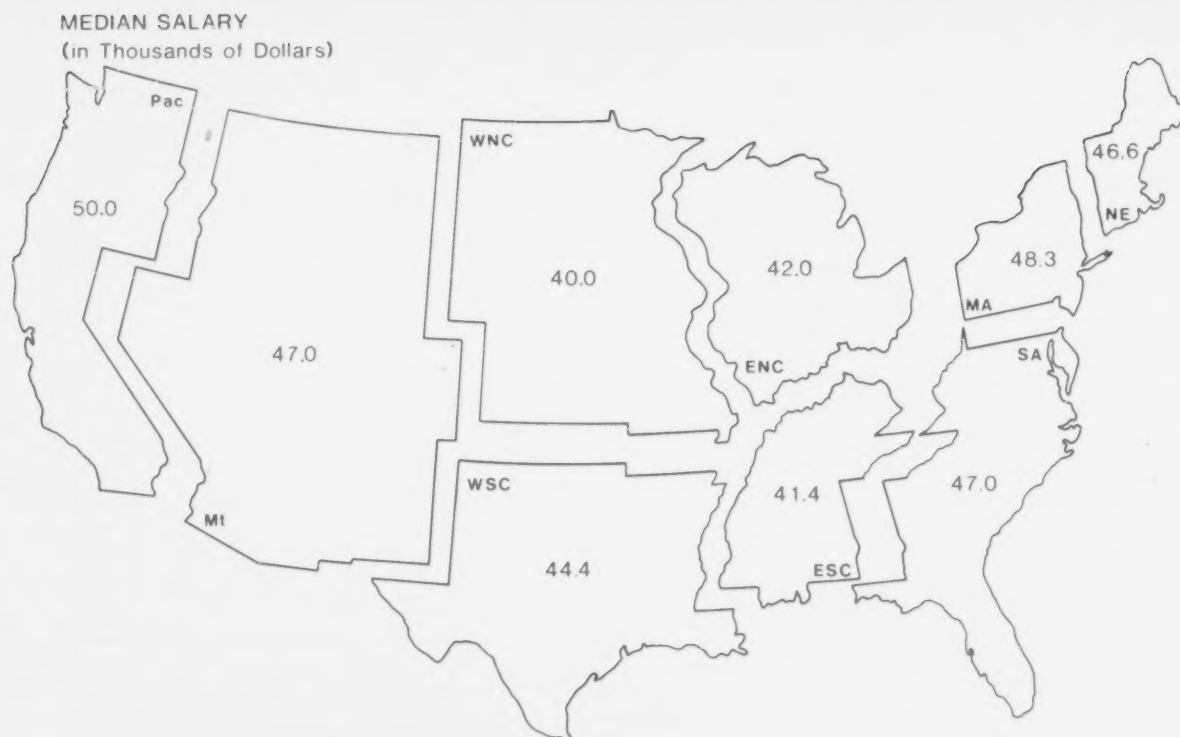


Figure 2. Variation in median salary for PhDs by geographic division, 1985.

engineers, skilled technicians, and administrators with special interests in specific society programs. As a result of this limited sample the bulk of this report focuses on those members holding doctoral degrees. Some limited discussion on lower degree holders can be found in the section pertaining to employment sector.

If further information is required about any portion of this report, the reader is urged to contact the Education and Employment Statistics Division at the American Institute of Physics.

## SALARIES AND GEOGRAPHIC LOCATION FOR PhDs

- From one region of the country to the next, median salaries for industrially employed members are consistently higher than those in other employment sectors. Salary differences between academically employed society members and those working in industry represent the greatest disparity, with salary differences ranging from \$11,000 in the Pacific to \$17,000 in the Mountain states. In addition, academically employed members are 2 to 6 years older than those in industry. The distribution of states within each division can be found in Appendix A.

Table 1. 1985 salaries by geographic division, PhDs.<sup>(a)</sup>

|                       | Median Salary | Mean Salary<br>(in thousands of dollars) | Standard Deviation | Median Age | Total Number Known |
|-----------------------|---------------|------------------------------------------|--------------------|------------|--------------------|
| New England           | 46.6          | 49.1                                     | 18.9               | 43         | 322                |
| Middle Atlantic       | 48.3          | 50.0                                     | 20.3               | 44         | 728                |
| South Atlantic        | 47.0          | 48.0                                     | 16.2               | 44         | 606                |
| East North Central    | 42.0          | 44.8                                     | 18.3               | 45         | 466                |
| East South Central    | 41.4          | 41.8                                     | 11.7               | 46         | 132                |
| West North Central    | 40.0          | 40.9                                     | 14.2               | 44         | 147                |
| West South Central    | 44.4          | 45.8                                     | 16.4               | 44         | 213                |
| Mountain              | 47.0          | 48.6                                     | 17.0               | 44         | 351                |
| Pacific               | 50.0          | 51.3                                     | 17.0               | 43         | 703                |
| Canada <sup>(b)</sup> | 49.7          | 49.8                                     | 16.0               | 44         | 154                |

<sup>(a)</sup> See Appendix A for state composition of each division.<sup>(b)</sup> Canadian salaries are reported in Canadian dollars. One U.S. dollar = 1.38 Canadian dollars.Table 2. 1985 reported salaries, adjusted salaries and employment sector distribution by geographic division, PhDs.<sup>(a)</sup>

|                    | Academic      |            |    | Industry      |            |    | Other         |            |    | Mean Salary | Adjusted Mean Salary |
|--------------------|---------------|------------|----|---------------|------------|----|---------------|------------|----|-------------|----------------------|
|                    | Median Salary | Median Age | %  | Median Salary | Median Age | %  | Median Salary | Median Age | %  |             |                      |
| New England        | 40.0          | 45         | 52 | 53.9          | 41         | 32 | 50.0          | 41         | 16 | 49.1        | 49.7                 |
| Middle Atlantic    | 40.0          | 46         | 44 | 54.0          | 42         | 44 | 49.6          | 44         | 12 | 50.0        | 48.7                 |
| South Atlantic     | 37.4          | 45         | 40 | 51.0          | 42         | 16 | 54.0          | 45         | 44 | 48.0        | 47.3                 |
| East North Central | 37.0          | 47         | 60 | 49.9          | 41         | 21 | 47.7          | 44         | 19 | 44.8        | 46.6                 |
| East South Central | 35.3          | 47         | 51 | *             | *          | *  | 46.4          | 44         | 44 | 41.8        | 44.2                 |
| West North Central | 35.0          | 45         | 70 | 50.0          | 40         | 25 | *             | *          | *  | 40.9        | 44.4                 |
| West South Central | 36.0          | 45         | 61 | 53.4          | 42         | 33 | *             | *          | *  | 45.8        | 46.7                 |
| Mountain           | 36.0          | 45         | 36 | 53.0          | 43         | 14 | 51.8          | 43         | 50 | 48.7        | 47.7                 |
| Pacific            | 42.0          | 46         | 35 | 53.4          | 42         | 39 | 51.0          | 43         | 26 | 51.4        | 50.0                 |
| Overall            | 38.4          | 46         | 46 | 52.6          | 42         | 29 | 50.6          | 44         | 25 | 48.2        | 48.2                 |

<sup>(a)</sup> Mean salaries for each division were statistically weighted to reflect an employment sector composition identical to that observed nationwide.

\*Number of respondents was too small to calculate reliable statistics.

● Society members employed in the highly industrialized Pacific coast and Middle Atlantic states command the highest salaries in the nation, \$50,000 and \$48,300 respectively.

● More than fifty percent of the full-time employed society members living in the Central United States and New England work in the academic sector. The four divisions comprising the central states have the lowest PhD salaries in the nation, ranging from \$40,000 to \$44,400. New England maintains a relatively high overall salary due to the well paid academic and industrial members residing in and around the Boston area.

● The three main factors that dictate the salary levels found throughout the United States are (1) the distribution of employment sectors within each division, (2) the salary structure for each employer type, and (3) the inter-divisional age variations. In order to get an accurate picture of the effects of geographic location on salaries, independent of variations in employment sector, divisional mean salaries were statistically weighted to control for those dissimilarities.

Table 3. 1983 and 1985 salaries by geographic division, PhDs.

|                    | Year | Median Salary | Mean Salary<br>(in thousands of dollars) | Standard Deviation | Median Age in 1985 | Total Number Known |
|--------------------|------|---------------|------------------------------------------|--------------------|--------------------|--------------------|
| New England        | 1983 | 42.0          | 42.9                                     | 13.8               | 46                 | 213                |
|                    | 1985 | 50.0          | 51.0                                     | 17.0               |                    |                    |
| Middle Atlantic    | 1983 | 43.0          | 44.3                                     | 15.6               | 45                 | 508                |
|                    | 1985 | 50.0          | 51.8                                     | 19.0               |                    |                    |
| South Atlantic     | 1983 | 42.0          | 43.2                                     | 13.5               | 46                 | 426                |
|                    | 1985 | 49.6          | 49.8                                     | 14.7               |                    |                    |
| East North Central | 1983 | 38.0          | 39.4                                     | 14.0               | 47                 | 330                |
|                    | 1985 | 44.1          | 46.8                                     | 18.6               |                    |                    |
| East South Central | 1983 | 36.7          | 36.7                                     | 9.6                | 47                 | 102                |
|                    | 1985 | 42.0          | 42.3                                     | 11.6               |                    |                    |
| West North Central | 1983 | 35.3          | 36.1                                     | 10.9               | 45                 | 105                |
|                    | 1985 | 42.0          | 42.4                                     | 13.7               |                    |                    |
| West South Central | 1983 | 40.0          | 41.4                                     | 14.6               | 45                 | 140                |
|                    | 1985 | 45.8          | 47.5                                     | 16.0               |                    |                    |
| Mountain           | 1983 | 41.0          | 43.2                                     | 14.0               | 45                 | 232                |
|                    | 1985 | 50.0          | 51.4                                     | 17.2               |                    |                    |
| Pacific            | 1983 | 43.7          | 45.3                                     | 13.0               | 45                 | 488                |
|                    | 1985 | 51.1          | 53.7                                     | 15.7               |                    |                    |

● After controlling on the different employer distributions in the various geographic divisions, the disparity in average salaries drops from \$10,500 to \$5,800. Some regional variation, however, continues to exist.

● Academically employed individuals living in the West North Central and the East South Central are the lowest paid PhDs in the nation with academic salaries more than \$3,000 under the mean academic salary observed nation wide.

● The highest paid industrially and academically employed society members live in the Pacific, New England, and Middle Atlantic states. The academic mean salaries within these regions are \$2,600 to \$4,600 greater than any other division, thus producing the three highest overall mean salaries.

● During the two-year span between March 1983 and March 1985 salaries for PhDs who remained in one regional division increased between 14 and 22%, considerably above the 9% inflation rate observed for that period.

● Between 1983 and 1985 PhDs living in the East South Central and the West South Central received the smallest divisional salary increases in the nation. While small salary increases at the national laboratories accounted for the suppressed salaries in the East South Central, a struggling oil industry in Texas, Oklahoma and Louisiana dampened salaries in the West South Central.

● The cities included in Table 5 all volunteered to participate in a survey developed by the American Chamber of Commerce Researchers Association. The questionnaire was developed to "provide a useful and reasonably accurate measurement of inter-city cost of living differences." The cost of living index represents a market basket of goods and services for the first quarter of 1985. Certain cities (Chicago, Washington D.C., and San Francisco) are notably absent from the list due to a lack of response to the survey.

Table 4. 1985 salaries and employment sector distribution for selected states and Canadian provinces, PhDs.<sup>(a)</sup>

|                        | Median Salary             | Mean Salary | Standard Deviation | Median Age | Total Number Known | Academic % | Industry % | Gov't % | FFR&DC % | Other % |
|------------------------|---------------------------|-------------|--------------------|------------|--------------------|------------|------------|---------|----------|---------|
|                        | (in thousands of dollars) |             |                    |            |                    |            |            |         |          |         |
| Alabama                | 41.0                      | 41.0        | 10.5               | 47         | 24                 | 68         | 4          | 24      | -        | 4       |
| Arizona                | 43.0                      | 44.8        | 17.1               | 44         | 53                 | 59         | 19         | 5       | 13       | 4       |
| California             | 50.0                      | 52.1        | 16.8               | 43         | 627                | 31         | 41         | 4       | 19       | 5       |
| Northern               | 51.6                      | 52.4        | 16.2               | 43         | 297                | 28         | 36         | 4       | 25       | 7       |
| Southern               | 49.7                      | 51.9        | 17.4               | 43         | 330                | 34         | 45         | 5       | 13       | 3       |
| Colorado               | 43.2                      | 47.1        | 18.6               | 44         | 92                 | 47         | 25         | 17      | 10       | 1       |
| Connecticut            | 45.0                      | 48.1        | 21.5               | 43         | 72                 | 51         | 39         | 4       | -        | 6       |
| Delaware               | 48.3                      | 46.2        | 11.7               | 42         | 28                 | 30         | 63         | -       | -        | 7       |
| DC                     | 54.8                      | 54.3        | 14.0               | 46         | 153                | 5          | 2          | 88      | -        | 5       |
| Florida                | 40.5                      | 42.9        | 15.4               | 46         | 49                 | 65         | 22         | 8       | -        | 5       |
| Georgia                | 44.1                      | 44.0        | 15.6               | 44         | 36                 | 81         | 16         | -       | -        | 3       |
| Illinois               | 43.0                      | 46.5        | 19.0               | 44         | 161                | 52         | 14         | -       | 30       | 4       |
| Indiana                | 37.0                      | 40.3        | 15.6               | 46         | 54                 | 82         | 14         | 2       | -        | 2       |
| Iowa                   | 37.0                      | 38.9        | 13.2               | 44         | 27                 | 88         | 3          | -       | 7        | 2       |
| Kansas                 | 38.9                      | 37.8        | 8.8                | 44         | 19                 | 91         | 9          | -       | -        | -       |
| Louisiana              | 40.5                      | 43.1        | 13.1               | 45         | 21                 | 83         | 10         | 2       | -        | 5       |
| Maryland               | 46.4                      | 47.9        | 14.8               | 42         | 159                | 33         | 22         | 39      | 2        | 4       |
| Massachusetts          | 48.0                      | 50.5        | 18.1               | 43         | 220                | 49         | 32         | 10      | 4        | 5       |
| Michigan               | 43.8                      | 45.7        | 18.1               | 46         | 87                 | 60         | 33         | 1       | -        | 6       |
| Minnesota              | 46.4                      | 46.1        | 16.1               | 42         | 44                 | 40         | 56         | -       | -        | 4       |
| Missouri               | 42.0                      | 42.4        | 15.7               | 44         | 35                 | 66         | 30         | -       | -        | 4       |
| New Jersey             | 50.1                      | 56.2        | 22.4               | 40         | 225                | 18         | 72         | 3       | 6        | 1       |
| New Mexico             | 51.7                      | 54.2        | 15.0               | 44         | 151                | 8          | 5          | 7       | 80       | -       |
| New York               | 47.5                      | 48.5        | 18.8               | 45         | 341                | 53         | 32         | 2       | 8        | 5       |
| Northern               | 47.0                      | 48.6        | 20.0               | 45         | 179                | 57         | 37         | 2       | 2        | 2       |
| Southern               | 48.0                      | 48.3        | 17.4               | 45         | 162                | 49         | 27         | 1       | 15       | 8       |
| North Carolina         | 37.0                      | 42.6        | 19.9               | 45         | 49                 | 88         | 6          | 2       | -        | 4       |
| Ohio                   | 44.0                      | 45.8        | 19.0               | 45         | 113                | 53         | 29         | 10      | 4        | 4       |
| Oklahoma               | 42.2                      | 45.1        | 17.8               | 43         | 21                 | 59         | 39         | -       | -        | 2       |
| Oregon                 | 35.2                      | 40.4        | 19.1               | 46         | 23                 | 67         | 29         | -       | -        | 4       |
| Pennsylvania           | 42.5                      | 44.3        | 18.0               | 44         | 161                | 63         | 27         | 4       | -        | 6       |
| Tennessee              | 43.6                      | 42.9        | 11.4               | 44         | 87                 | 38         | 7          | -       | 54       | 1       |
| Texas                  | 46.0                      | 47.0        | 16.7               | 43         | 160                | 56         | 38         | 1       | -        | 5       |
| Utah                   | 38.0                      | 39.4        | 15.0               | 44         | 24                 | 90         | 8          | -       | -        | 2       |
| Virginia               | 49.5                      | 49.6        | 17.7               | 45         | 99                 | 46         | 22         | 20      | 6        | 6       |
| Washington             | 43.0                      | 45.0        | 15.9               | 43         | 42                 | 62         | 33         | -       | 5        | -       |
| Wisconsin              | 35.4                      | 39.8        | 16.0               | 43         | 50                 | 79         | 17         | 1       | -        | 3       |
| Ontario <sup>(b)</sup> | 49.7                      | 48.9        | 13.9               | 44         | 69                 | 56         | 14         | 29      | -        | 1       |
| Quebec                 | 44.7                      | 49.4        | 17.7               | 44         | 27                 | 82         | 14         | -       | -        | 4       |

<sup>(a)</sup> Several states were not included above because the number of respondents was too small to calculate reliable statistics.<sup>(b)</sup> Canadian salaries are reported in Canadian dollars. One U.S. dollar = 1.38 Canadian dollars.

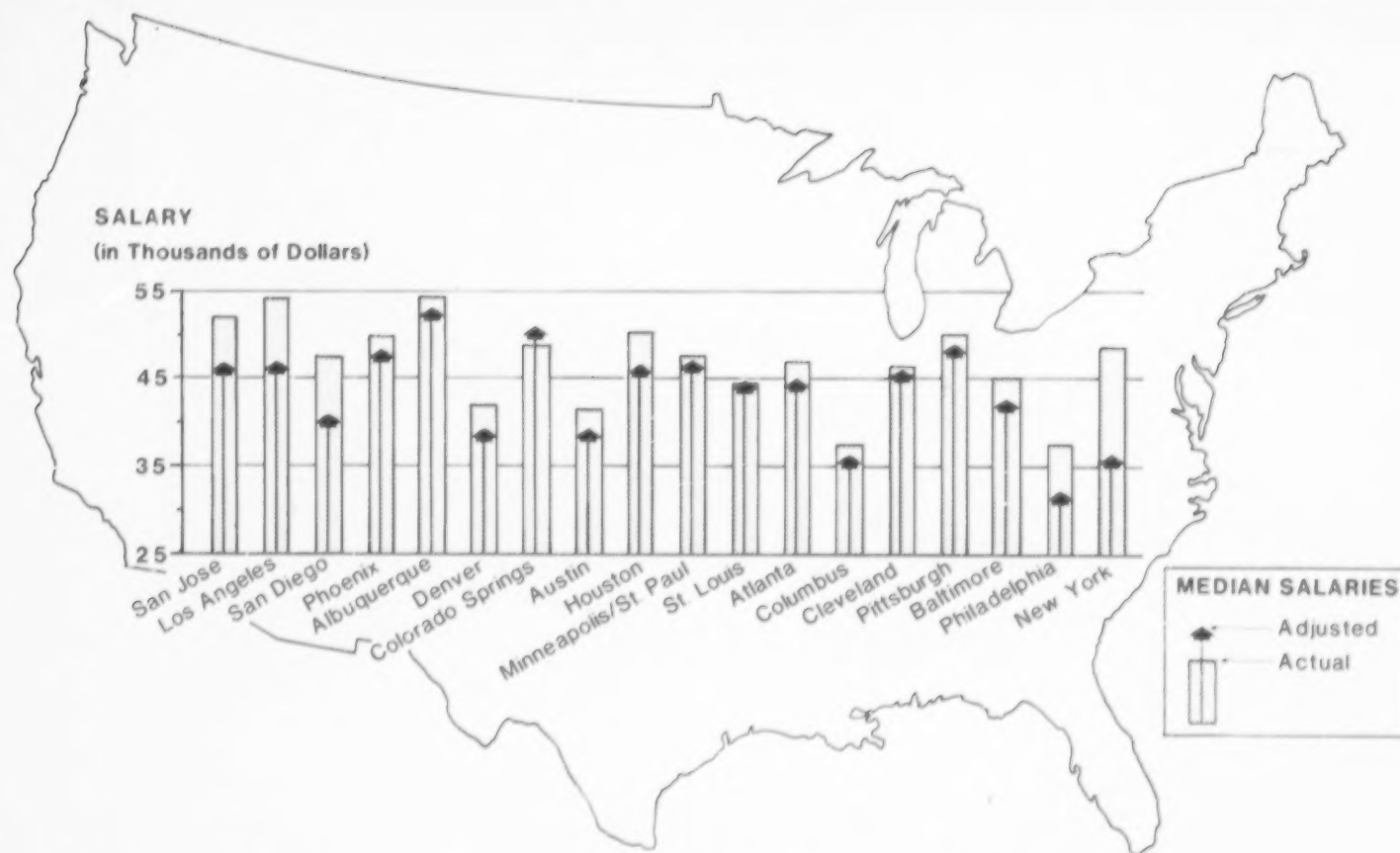


Figure 3. Median salaries for PhDs in 18 metropolitan areas, 1985. Both actual salaries and salaries adjusted for cost of living are presented.

● There is a direct relationship between the size of a metropolitan area and the cost of living. In general, society members tend to reside in larger, more expensive urban centers. As a consequence, only two cities listed in Table 5, Colorado Springs and St. Louis, have a lower cost of living index than the national average (100).

● PhD society members living in the New York metropolitan area have a median salary \$2,000 above the national. While this initially appears attractive, one must consider that New York is one of the most expensive cities in the continental United States. Members making the \$49,000 median salary in New York earn an adjusted salary nearly \$10,000 less than the national median. In addition society members in New York are, in general, older than colleagues in other cities.

Table 5. 1985 median salaries adjusted for cost of living in selected metropolitan areas, PhDs.<sup>(a)</sup>

|                      | Cost of Living Index | Median Salary | Adjusted Salary | Median Age | Academic % | Non-Academic % | Total Number Known |
|----------------------|----------------------|---------------|-----------------|------------|------------|----------------|--------------------|
| Albuquerque          | 102.3                | 54.0          | 52.8            | 42         | 15         | 85             | 52                 |
| Atlanta              | 103.8                | 46.8          | 45.1            | 42         | 76         | 24             | 29                 |
| Austin               | 105.5                | 41.5          | 39.3            | 43         | 77         | 23             | 30                 |
| Baltimore            | 105.0                | 45.0          | 42.8            | 42         | 51         | 49             | 36                 |
| Cleveland            | 101.4                | 46.0          | 45.4            | 38         | 27         | 73             | 26                 |
| Colorado Springs     | 96.5                 | 48.8          | 50.6            | 43         | 29         | 71             | 19                 |
| Columbus             | 102.8                | 37.1          | 36.1            | 46         | 80         | 20             | 30                 |
| Denver               | 107.0                | 42.0          | 39.2            | 43         | 51         | 49             | 20                 |
| Houston              | 109.0                | 50.1          | 46.0            | 43         | 54         | 46             | 50                 |
| Los Angeles          | 116.6                | 54.0          | 46.3            | 44         | 29         | 71             | 124                |
| Minneapolis/St. Paul | 101.4                | 47.5          | 46.8            | 41         | 37         | 63             | 41                 |
| New York             | 134.4                | 49.0          | 36.4            | 46         | 55         | 45             | 120                |
| Philadelphia         | 114.6                | 37.0          | 32.3            | 42         | 69         | 31             | 45                 |
| Phoenix              | 104.7                | 50.0          | 47.8            | 40         | 52         | 48             | 20                 |
| Pittsburgh           | 102.9                | 50.0          | 48.6            | 47         | 45         | 55             | 50                 |
| St. Louis            | 99.8                 | 44.4          | 44.5            | 42         | 48         | 52             | 22                 |
| San Diego            | 116.4                | 47.2          | 40.5            | 45         | 29         | 71             | 53                 |
| San Jose             | 112.1                | 52.0          | 46.4            | 40         | 29         | 71             | 38                 |

<sup>(a)</sup> Cost of Living Index from the American Chamber of Commerce Researchers Association, national average = 100.0

$$\text{Adjusted salary} = \frac{\text{Median Salary}}{\text{cost of living \%}}$$

● Individuals residing in Philadelphia, Los Angeles, San Diego, and San Jose are also hit hard by the cost of living. While members living in the California cities are mainly employed in industry and thus have median salaries above the national median prior to adjusting, Philadelphia's unweighted salary starts \$9,000 below the national median. Consequently members in Philadelphia have the lowest adjusted median salary.

● Albuquerque, New Mexico and Colorado Springs, Colorado are the only cities listed that maintain median salaries over \$50,000 after adjusting for the cost of living. Albuquerque has the lowest proportion of academically employed members of all the cities listed while members living in Colorado Springs enjoy a relatively low cost of living, thus accounting for the high median salaries.

## SALARIES AND EMPLOYMENT SECTOR FOR PhDs

● In 1985, the median salary reported by society members with PhDs rose to \$46,000. This represents an increase of 6.5% from the previous year, substantially greater than the 3.7% rate of inflation observed during this period.

● Starting salaries (see median salaries, 0-4 years from degree) are highest in industry, followed by government and national laboratories, and then universities. Government starting salaries, traditionally somewhat lower than those in national laboratories, increased rapidly over the year and are now in line with those at the national laboratories.

**MEDIAN SALARY**  
(in Thousands of Dollars)

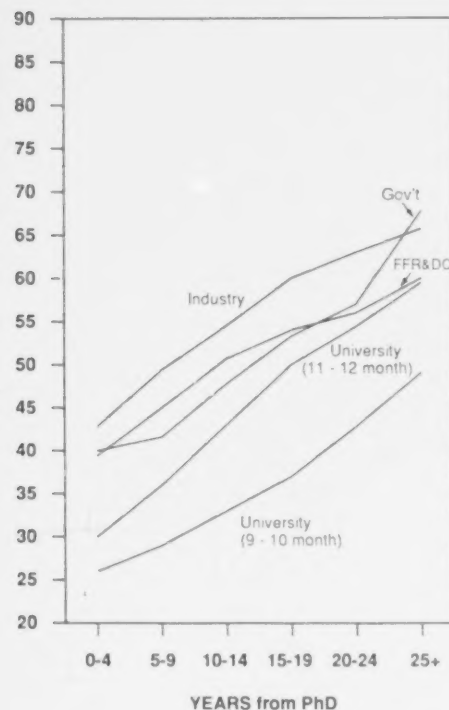


Figure 4. Median salaries by type of employer and years from PhD, 1985.

**SALARY**  
(in Thousands of Dollars)

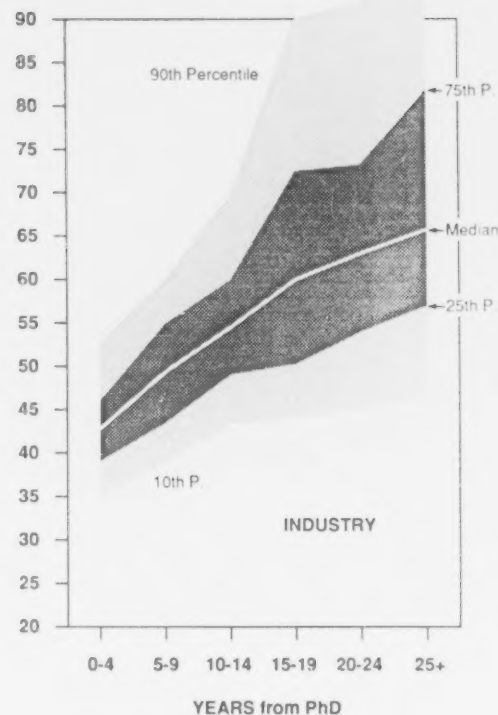


Figure 5. Salary structure in industry by years from PhD, 1985.

**SALARY**  
(in Thousands of Dollars)

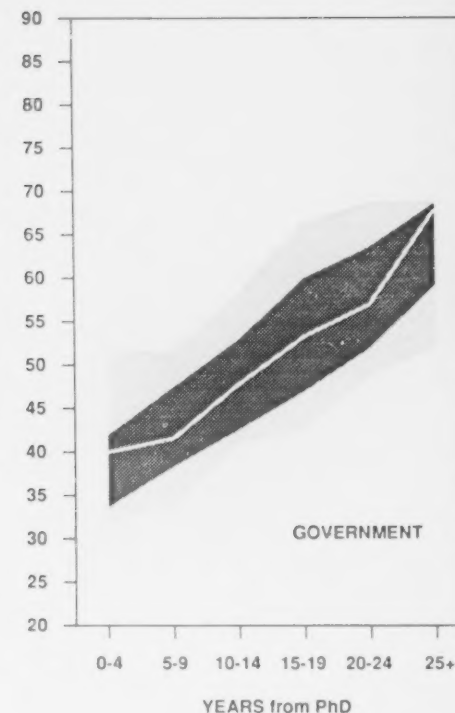


Figure 6. Salary structure in government by years from PhD, 1985.

● Industrially employed PhDs commanded the highest median salaries, \$52,600. Those employed in government or national laboratories earned somewhat less, \$51,000 and \$50,600, respectively. In general, scientists employed in universities and four-year colleges reported lower salaries than their non-academic peers. Those employed in universities on an 11-12 month salary base, for example, earned a median salary of close to \$43,000, highest within the academic sphere yet well below the overall median salary.

● Although percentage increases in salary levels across all employment sectors remained comfortably ahead of inflation, those observed in academe were the largest. Between 1983 and 1985, median industrial salaries increased approximately 5% per year and median government salaries rose somewhat faster at 6%. During this same period, salaries in universities and four-year colleges climbed by roughly 7%. Despite these increases, median salaries of university-employed scientists remain lower than those employed in non-academic spheres.

Table 6. 1985 salaries by major employment sector type, PhDs.

|                        | Median Salary<br>(in thousands of dollars) | Mean Salary<br>(in thousands of dollars) | Standard Deviation<br>(in thousands of dollars) | Median Age | Total Number Known |
|------------------------|--------------------------------------------|------------------------------------------|-------------------------------------------------|------------|--------------------|
| University             |                                            |                                          |                                                 |            |                    |
| 9-10 Month Salary      | 39.0                                       | 41.2                                     | 12.7                                            | 48         | 823                |
| 11-12 Month Salary     | 42.7                                       | 43.8                                     | 17.8                                            | 42         | 545                |
| 4-Year Colleges        |                                            |                                          |                                                 |            |                    |
| 9-10 Month Salary      | 30.0                                       | 30.8                                     | 7.8                                             | 45         | 150                |
| Industry/Self-Employed | 52.6                                       | 57.0                                     | 19.5                                            | 42         | 1045               |
| Government             | 51.0                                       | 51.5                                     | 12.3                                            | 45         | 349                |
| FFR&DC                 | 50.6                                       | 51.8                                     | 13.7                                            | 43         | 427                |
| Nonprofit              | 48.0                                       | 49.6                                     | 19.2                                            | 43         | 86                 |
| Hospital               | 52.1                                       | 55.1                                     | 21.3                                            | 44         | 47                 |

Table 7. 1985 salaries by years from degree, PhDs.

| Years from Degree | Median Salary<br>(in thousands of dollars) | Mean Salary<br>(in thousands of dollars) | Standard Deviation<br>(in thousands of dollars) | Median Age | Total Number Known |
|-------------------|--------------------------------------------|------------------------------------------|-------------------------------------------------|------------|--------------------|
| 0-4               | 33.0                                       | 33.7                                     | 11.6                                            | 32         | 539                |
| 5-9               | 42.0                                       | 42.2                                     | 12.4                                            | 36         | 622                |
| 10-14             | 47.4                                       | 47.3                                     | 13.9                                            | 41         | 644                |
| 15-19             | 50.0                                       | 50.9                                     | 18.2                                            | 45         | 693                |
| 20-24             | 52.0                                       | 52.9                                     | 15.6                                            | 50         | 471                |
| 25-29             | 55.0                                       | 57.7                                     | 19.3                                            | 55         | 317                |
| 30 +              | 60.0                                       | 61.0                                     | 20.9                                            | 61         | 373                |

Table 8. 1985 industrial salary structure by years from degree, PhDs.<sup>(a)</sup>

| Years from Degree | 10th | 25th | PERCENTILE SALARIES<br>Median<br>(in thousands of dollars) | 75th | 90th  | Mean Salary | Standard Deviation | Median Age | Total Number Known |
|-------------------|------|------|------------------------------------------------------------|------|-------|-------------|--------------------|------------|--------------------|
| 0-4               | 35.0 | 39.1 | 42.8                                                       | 46.1 | 52.9  | 43.6        | 8.7                | 32         | 175                |
| 5-9               | 39.0 | 43.5 | 49.4                                                       | 55.0 | 60.0  | 50.1        | 9.8                | 36         | 236                |
| 10-14             | 43.4 | 49.1 | 54.5                                                       | 60.0 | 69.6  | 56.0        | 12.1               | 41         | 196                |
| 15-19             | 44.0 | 50.3 | 60.0                                                       | 72.5 | 90.0  | 64.0        | 21.7               | 45         | 179                |
| 20-24             | 45.0 | 54.0 | 63.0                                                       | 73.3 | 91.8  | 66.1        | 19.4               | 50         | 92                 |
| 25 +              | 46.3 | 57.0 | 65.7                                                       | 81.8 | 103.0 | 72.3        | 27.5               | 59         | 152                |

<sup>(a)</sup> In addition, there were 9 postdoctorates with a median salary of \$34,700.

Table 9. 1985 government salary structure by years from degree, PhDs.<sup>(a)</sup>

| Years from Degree | 10th | 25th | PERCENTILE SALARIES<br>Median<br>(in thousands of dollars) | 75th | 90th | Mean Salary | Standard Deviation | Median Age | Total Number Known |
|-------------------|------|------|------------------------------------------------------------|------|------|-------------|--------------------|------------|--------------------|
| 0-4               | 31.8 | 33.7 | 40.0                                                       | 42.0 | 52.0 | 41.0        | 10.7               | 34         | 26                 |
| 5-9               | 34.0 | 38.4 | 41.6                                                       | 47.5 | 51.4 | 42.8        | 7.9                | 38         | 51                 |
| 10-14             | 41.0 | 42.7 | 47.8                                                       | 53.0 | 58.3 | 49.0        | 8.9                | 41         | 68                 |
| 15-19             | 42.6 | 47.0 | 53.3                                                       | 60.0 | 66.3 | 53.3        | 8.9                | 46         | 73                 |
| 20-24             | 48.9 | 52.0 | 57.0                                                       | 63.6 | 68.7 | 57.5        | 7.8                | 50         | 47                 |
| 25 +              | 52.0 | 59.2 | 67.8                                                       | 68.6 | 68.8 | 63.4        | 7.9                | 59         | 68                 |

<sup>(a)</sup> In addition, there was 13 postdoctorates with a median salary of \$25,200.

**SALARY**  
(In Thousands of Dollars)

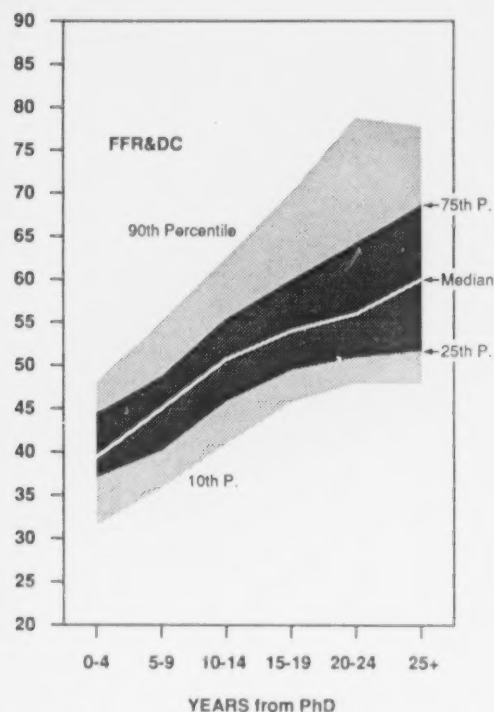


Figure 7. Salary structure in the national laboratories by years from PhD, 1985.

**SALARY**  
(In Thousands of Dollars)

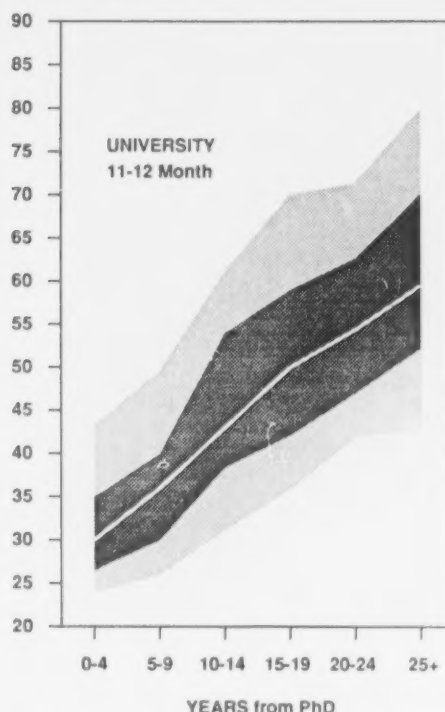


Figure 8. Salary structure in universities for 11-12 month salary base, by years from PhD, 1985.

**SALARY**  
(In Thousands of Dollars)

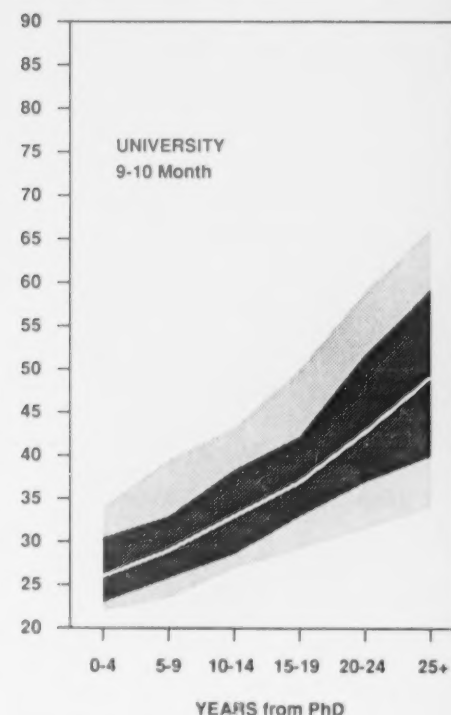


Figure 9. Salary structure in universities for 9-10 month salary base, by years from PhD, 1985.

- Salaries climb with professional experience. In contrast to the relatively stable academic salary range across experience levels, industrial salary ranges broaden with experience. This reflects the multiple research and administrative paths available in industry. The high salaries commanded by those engaged in administration, as well as the self-employed, pushed the top salaries of industrial scientists with twenty-five or more years of experience past the \$100,000 mark.

- Salary ranges in the national laboratories, which remain relatively stable

during the early career stages, expand sharply after fifteen years of experience. This is in large part due to administrators whose median yearly earnings exceed \$76,000.

- The typical 9-10 month university salaries have a relatively narrow range across experience levels. In contrast, the 11-12 month salary ranges are both broader and more variable. This reflects a diversity of academic positions including non-tenure line research staff, administrative personnel and professors with federal grant-based salaries.

**Table 10. 1985 FFR&DC salary structure by years from degree, PhDs.<sup>(a)</sup>**

| Years from<br>Degree | 10th | PERCENTILE SALARIES       |        |      |      | Mean<br>Salary | Standard<br>Deviation | Median<br>Age | Total<br>Number<br>Known |
|----------------------|------|---------------------------|--------|------|------|----------------|-----------------------|---------------|--------------------------|
|                      |      | 25th                      | Median | 75th | 90th |                |                       |               |                          |
|                      |      | (in thousands of dollars) |        |      |      |                |                       |               |                          |
| 0-4                  | 31.6 | 37.1                      | 39.4   | 44.5 | 48.0 | 40.2           | 5.6                   | 32            | 36                       |
| 5-9                  | 35.9 | 40.2                      | 45.0   | 48.8 | 55.0 | 45.0           | 6.9                   | 36            | 69                       |
| 10-14                | 41.0 | 45.9                      | 50.7   | 55.5 | 62.4 | 51.6           | 10.0                  | 41            | 89                       |
| 15-19                | 45.8 | 49.5                      | 54.0   | 60.0 | 70.0 | 55.7           | 10.4                  | 44            | 88                       |
| 20-24                | 48.0 | 51.0                      | 56.0   | 64.3 | 78.8 | 59.4           | 11.4                  | 49            | 46                       |
| 25 +                 | 48.0 | 51.7                      | 60.0   | 68.7 | 77.8 | 62.2           | 15.1                  | 58            | 75                       |

<sup>(a)</sup> In addition, there were 22 postdoctorates with a median salary of \$26,600.

**Table 11. 1985 university 11-12 month salary structure by years from degree, PhDs.<sup>(a)</sup>**

| Years from Degree | 10th | PERCENTILE SALARIES       |        |      |      | Mean Salary | Standard Deviation | Median Age | Total Number Known |
|-------------------|------|---------------------------|--------|------|------|-------------|--------------------|------------|--------------------|
|                   |      | 25th                      | Median | 75th | 90th |             |                    |            |                    |
|                   |      | (in thousands of dollars) |        |      |      |             |                    |            |                    |
| 0-4               | 24.0 | 26.5                      | 30.0   | 35.0 | 43.2 | 31.4        | 8.9                | 32         | 40                 |
| 5-9               | 26.0 | 30.0                      | 36.0   | 40.0 | 49.5 | 37.1        | 10.1               | 36         | 92                 |
| 10-14             | 31.2 | 38.4                      | 43.0   | 54.0 | 61.1 | 45.6        | 12.3               | 40         | 76                 |
| 15-19             | 35.9 | 42.1                      | 50.0   | 59.0 | 70.0 | 51.4        | 15.8               | 45         | 94                 |
| 20-24             | 42.0 | 47.0                      | 54.4   | 62.7 | 71.4 | 55.5        | 12.7               | 50         | 64                 |
| 25 +              | 42.8 | 52.2                      | 59.5   | 70.1 | 80.0 | 61.1        | 13.8               | 58         | 88                 |

<sup>(a)</sup> In addition, there are 76 postdocs in the 0-4 years from degree group with known salaries working in universities on an 11-12 month salary base. Their median salary is \$21,100.

**Table 12. 1985 university 9-10 month salary structure by years from degree, PhDs.<sup>(a)</sup>**

| Years from Degree | 10th | PERCENTILE SALARIES       |        |      |      | Mean Salary | Standard Deviation | Median Age | Total Number Known |
|-------------------|------|---------------------------|--------|------|------|-------------|--------------------|------------|--------------------|
|                   |      | 25th                      | Median | 75th | 90th |             |                    |            |                    |
|                   |      | (in thousands of dollars) |        |      |      |             |                    |            |                    |
| 0-4               | 22.0 | 23.0                      | 26.0   | 30.5 | 34.0 | 26.8        | 4.6                | 32         | 55                 |
| 5-9               | 23.5 | 25.8                      | 29.0   | 33.0 | 39.5 | 30.9        | 8.4                | 36         | 85                 |
| 10-14             | 27.0 | 28.6                      | 33.0   | 38.4 | 43.2 | 34.1        | 7.1                | 41         | 96                 |
| 15-19             | 29.2 | 33.0                      | 37.0   | 42.3 | 50.0 | 38.8        | 9.6                | 45         | 163                |
| 20-24             | 31.6 | 37.0                      | 42.8   | 51.8 | 59.0 | 44.2        | 10.4               | 50         | 166                |
| 25 +              | 34.0 | 40.0                      | 49.1   | 59.2 | 66.2 | 49.8        | 12.6               | 59         | 256                |

<sup>(a)</sup> Postdocs excluded

SALARY  
(in Thousands of Dollars)

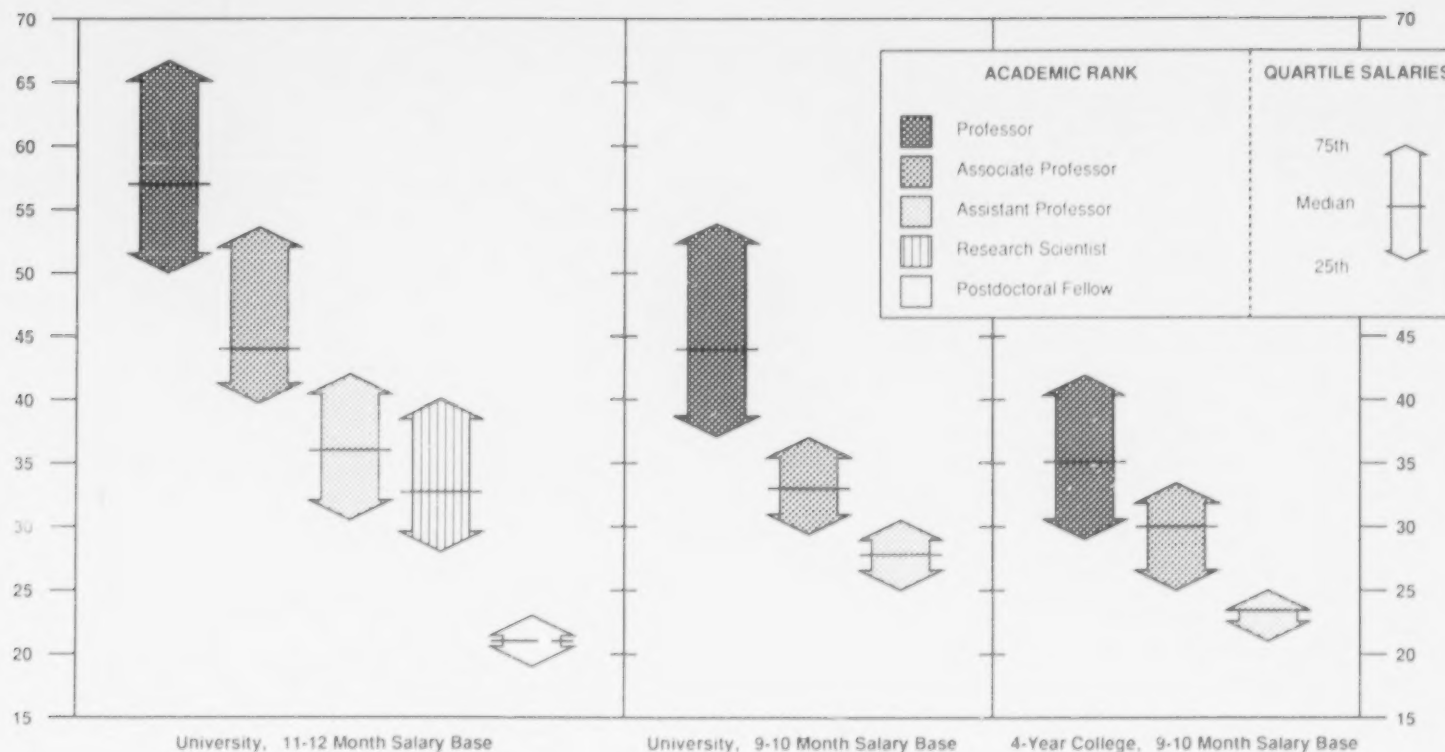


Figure 10. University and 4-year college salaries for PhDs by academic rank, 1985.

### Salaries and Academic Rank

- Over the last three years, the salaries at universities and 4-year colleges have shown a steady 7% increase per year. This is nearly twice the rate of inflation (3½–4% per year since 1982) and, thus, represents a real increase in take-home pay for the academically employed. These increases are also slightly higher than those reported nationally for each academic rank by the American Association of University Professors.
- University professoriate salaries on a 11–12 month base exhibit a very wide range, reflecting the prevalence of research grant-based salaries.

- University associate professors also have a wide salary range. Most of the associate professors who are in the upper quartile of the salary distribution work in medical physics or are employed by a university medical center.
- Between 1984 and 1985, the median salary paid to postdoctoral fellows finally showed a significant increase, jumping about 8%. This one year change is almost as large as the salary increases over the preceding three years combined.

Table 13. 1985 university salaries by selected academic rank and salary base, PhDs.

|                                         | QUARTILE SALARIES |                                     |      | Mean Salary | Standard Deviation | Median Age | Total Number Known |
|-----------------------------------------|-------------------|-------------------------------------|------|-------------|--------------------|------------|--------------------|
|                                         | 25th              | Median<br>(in thousands of dollars) | 75th |             |                    |            |                    |
| Professor                               |                   |                                     |      |             |                    |            |                    |
| 9-10 month salary                       | 37.1              | 44.0                                | 53.9 | 46.2        | 11.8               | 52         | 543                |
| 11-12 month salary                      | 50.0              | 57.0                                | 66.7 | 58.5        | 12.8               | 52         | 180                |
| Associate Professor                     |                   |                                     |      |             |                    |            |                    |
| 9-10 month salary                       | 29.4              | 33.0                                | 37.0 | 33.5        | 6.2                | 44         | 144                |
| 11-12 month salary                      | 39.7              | 44.0                                | 53.6 | 48.3        | 16.3               | 42         | 74                 |
| Assistant Professor                     |                   |                                     |      |             |                    |            |                    |
| 9-10 month salary                       | 25.0              | 27.8                                | 30.5 | 27.9        | 4.3                | 34         | 120                |
| 11-12 month salary                      | 30.5              | 36.0                                | 42.0 | 37.0        | 9.2                | 35         | 62                 |
| Research Associate (11-12 month salary) |                   |                                     |      |             |                    |            |                    |
| Postdoctorates                          | 19.0              | 21.0                                | 23.0 | 21.0        | 3.5                | 31         | 81                 |
| Other Research Staff                    | 28.0              | 32.7                                | 40.0 | 35.7        | 10.4               | 39         | 62                 |

Table 14. 1985 4-year college salaries by selected academic rank on 9-10 month salary base, PhDs.

|                     | QUARTILE SALARIES |                                     |      | Mean Salary | Standard Deviation | Median Age | Total Number Known |
|---------------------|-------------------|-------------------------------------|------|-------------|--------------------|------------|--------------------|
|                     | 25th              | Median<br>(in thousands of dollars) | 75th |             |                    |            |                    |
| Professor           | 29.0              | 35.1                                | 41.9 | 35.0        | 7.7                | 49         | 71                 |
| Associate Professor | 25.0              | 30.0                                | 33.4 | 29.8        | 5.6                | 45         | 43                 |
| Assistant Professor | 21.0              | 23.4                                | 25.0 | 23.8        | 3.5                | 34         | 34                 |

- Research scientist salaries are close to assistant professors on 11-12 month salary base. However, the ages of these non-tenured staff are closer to associate professors.
- The aging of the university professoriate, noted in previous reports, continues to be a major concern. Over 60% of the society members who hold a professorial rank in a university are full professors, whose median age as a group has climbed to 52 from 49 in 1981. This top-heavy age structure results in comparatively few entry-level positions and, consequently, only 1 in 6 professors are at the assistant professor rank.
- Salaries earned by members employed in 4-year colleges are 10-20% lower at each professorial rank than those earned by their colleagues in universities on a 9-10 month salary base.

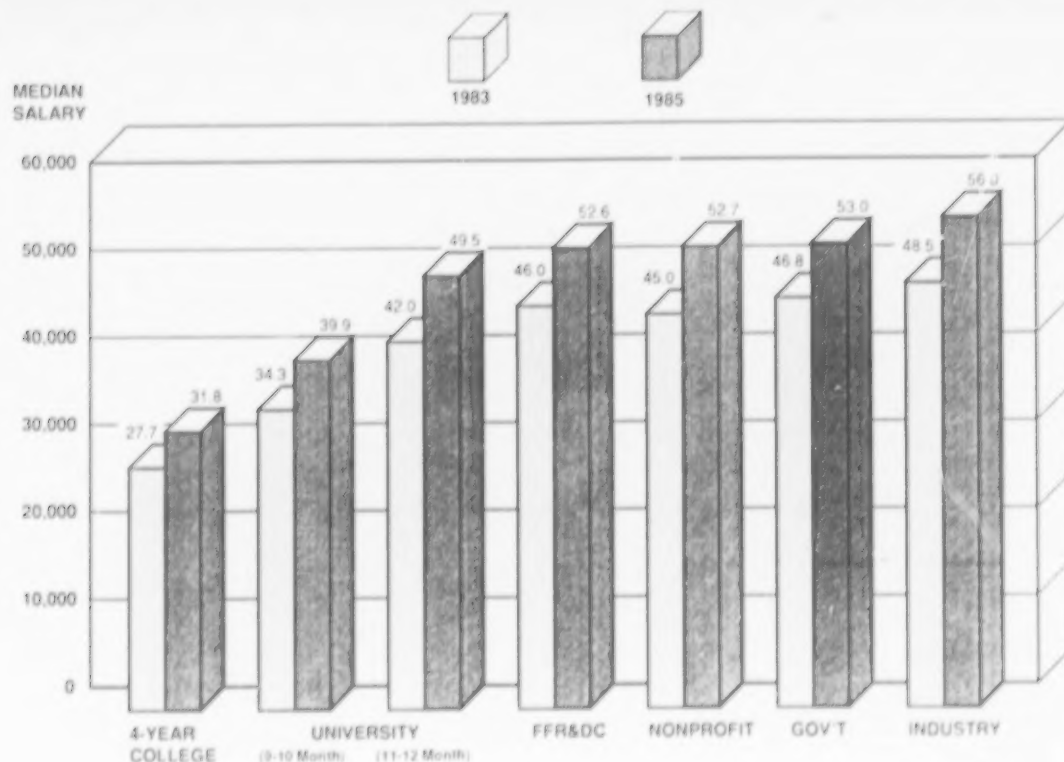


Figure 11. 1983 and 1985 median salaries by employment sector for PhDs remaining with the same employer.

### Salary Increases and Employment Sector, 1983-1985.

- Median salaries for PhDs who remained with the same employer from 1983 to 1985 showed increases in the 14-18% range, nearly double the 8.7% inflation rate over that two-year period.
- Despite the fact that the inflation rate declined between 1983 and 1985, PhDs in universities received salary increases comparable to those of the preceding two years. However, industrial salaries and those in the national laboratories have begun to show a small compression. It is likely that with

the inflation rate's continued decline to about 3% a year since 1985, the size of salary increments reported in the future will adjust downward in most employment sectors.

- PhDs employed in 4-year colleges earned the lowest salary levels. With these institutions fighting against declining enrollments, the PhDs in this sector also received among the lowest salary increases, about 15% over the two years.

Table 15. 1983 and 1985 salaries for members continuing with the same employer within selected employment sectors, PhDs.

|                      | Year              | Median Salary | Mean Salary<br>(in thousands of dollars) | Standard Deviation | Median Age in 1985 | Total Number Known |
|----------------------|-------------------|---------------|------------------------------------------|--------------------|--------------------|--------------------|
| University           |                   |               |                                          |                    |                    |                    |
|                      | 9-10 month salary |               |                                          |                    |                    |                    |
|                      | 1983              | 34.3          | 35.9                                     | 9.8                |                    |                    |
|                      | 1985              | 39.9          | 42.1                                     | 12.4               | 49                 | 558                |
| 11-12 month salary   | 1983              | 42.0          | 42.7                                     | 14.0               |                    |                    |
|                      | 1985              | 49.5          | 49.6                                     | 15.4               | 46                 | 313                |
|                      |                   |               |                                          |                    |                    |                    |
| 4-Year College       |                   |               |                                          |                    |                    |                    |
|                      | 9-10 month salary |               |                                          |                    |                    |                    |
|                      | 1983              | 27.7          | 27.9                                     | 6.6                |                    |                    |
|                      | 1985              | 31.8          | 32.4                                     | 7.5                | 45                 | 101                |
| Industry             | 1983              | 48.5          | 51.4                                     | 14.8               |                    |                    |
|                      | 1985              | 56.0          | 60.0                                     | 19.6               | 43                 | 602                |
| Government           | 1983              | 46.8          | 48.2                                     | 10.4               |                    |                    |
|                      | 1985              | 53.0          | 54.2                                     | 10.6               | 46                 | 244                |
| FFR&DC               | 1983              | 46.0          | 46.8                                     | 10.5               |                    |                    |
|                      | 1985              | 52.6          | 54.6                                     | 12.9               | 44                 | 299                |
| Hospital & Nonprofit | 1983              | 45.0          | 47.0                                     | 14.0               |                    |                    |
|                      | 1985              | 52.7          | 55.0                                     | 16.8               | 47                 | 79                 |

<sup>(a)</sup> Data based on society members who responded in both 1983 and 1985, were full-time employed, and did not change employers in the years 1983-85.

### Salary Increases within Universities, 1983-1985.

- Society members who were employed in universities as full or associate professors and did not change their rank during the two years from 1983 to 1985, received salary increases in the 12-15% range. Research scientists employed in universities on soft money contracts also earned increases just under 15%.

- By comparison, society members at entry-level ranks in the universities fared much better over the same two year period. PhDs holding assistant professorships received salary increases of 20% and more between 1983 and 1985.

### Salary Increases and Employer Changes, 1983-1985.

- The magnitude of the salary change for PhDs who changed employers between 1983 and 1985 reflects two phenomena: the individual's relative position within the salary structure of his or her 1983 employer and the overall differences in salary levels paid by the major employment sectors.

- Salary levels differ widely between the university and industrial sectors. PhDs who left universities and moved into industry were among the youngest of those who changed their employers and they literally doubled their salaries by taking industrial positions.

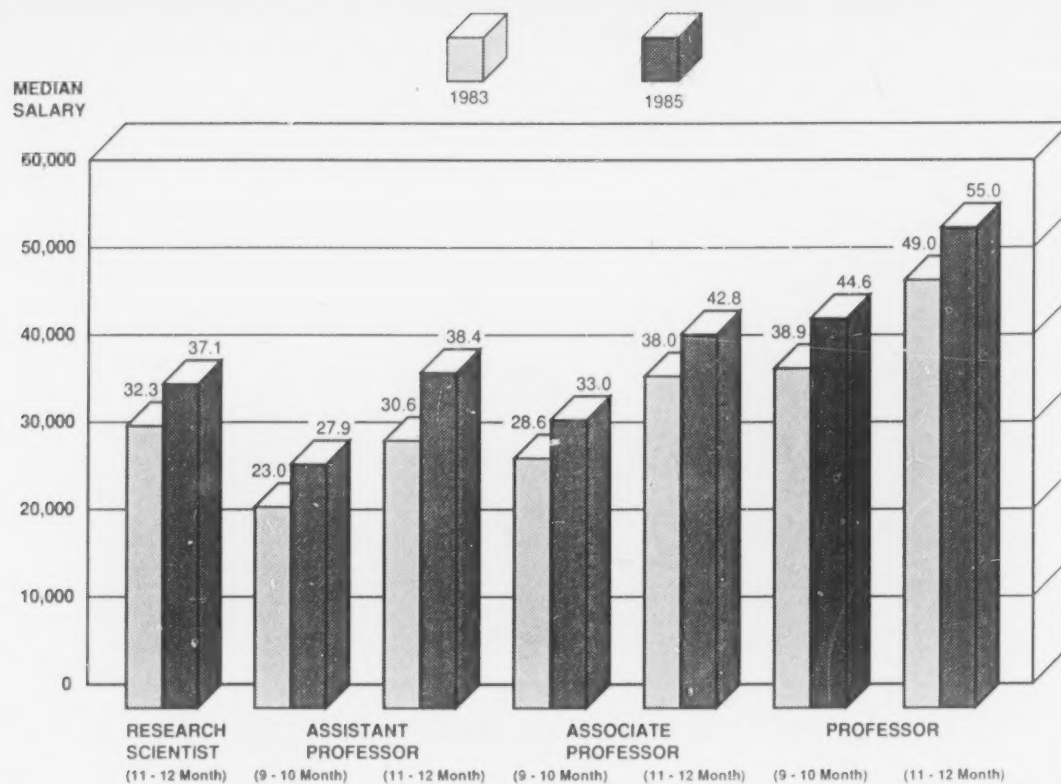


Figure 12. 1983 and 1985 median salaries by academic rank for PhDs remaining within the same rank.

- PhDs who changed employers within the university sector also tend to be young (below 40 years of age) and typically changed academic rank along with their employer. Consequently, their salary levels increased substantially between 1983 and 1985.
- PhDs who changed employers within industry, or moved from employment in government and the national laboratories into industry, earned 20% and more in 1985 compared to their salaries in 1983. In both cases, these increases were higher than those received by their colleagues who stayed with the same non-academic employer over the two-year period.

Table 16. 1983 and 1985 salaries for members continuing to work in the same university by academic rank, PhDs.

|                                     | Year | Median Salary             | Mean Salary | Standard Deviation | Median Age in 1985 | Total Number Known |
|-------------------------------------|------|---------------------------|-------------|--------------------|--------------------|--------------------|
|                                     |      | (in thousands of dollars) |             |                    |                    |                    |
| Full Professor                      | 1983 | 38.9                      | 40.2        | 8.7                |                    |                    |
| 9-10 month salary                   | 1985 | 44.6                      | 46.9        | 11.8               | 53                 | 367                |
| Full Professor                      | 1983 | 49.0                      | 50.3        | 9.6                |                    |                    |
| 11-12 month salary                  | 1985 | 55.0                      | 58.1        | 12.7               | 53                 | 105                |
| Associate Professor                 | 1983 | 28.6                      | 28.7        | 4.3                |                    |                    |
| 9-10 month salary                   | 1985 | 33.0                      | 33.2        | 5.5                | 45                 | 87                 |
| Associate Professor                 | 1983 | 38.0                      | 40.5        | 13.2               |                    |                    |
| 11-12 month salary                  | 1985 | 42.8                      | 46.4        | 13.6               | 43                 | 35                 |
| Assistant Professor                 | 1983 | 23.0                      | 24.0        | 3.6                |                    |                    |
| 9-10 month salary                   | 1985 | 27.9                      | 28.2        | 4.0                | 37                 | 49                 |
| Assistant Professor                 | 1983 | 30.6                      | 33.6        | 10.2               |                    |                    |
| 11-12 month salary                  | 1985 | 38.4                      | 40.2        | 10.0               | 37                 | 20                 |
| Research Staff (11-12 month salary) | 1983 | 32.3                      | 31.9        | 7.8                |                    |                    |
| (not Postdoctorates)                | 1985 | 37.1                      | 38.3        | 10.4               | 41                 | 32                 |

Table 17. 1983 and 1985 salaries for members who changed employers during the two years, PhDs.

|                                 | Year | Median Salary             | Mean Salary | Standard Deviation | Median Age in 1985 | Total Number Known |
|---------------------------------|------|---------------------------|-------------|--------------------|--------------------|--------------------|
|                                 |      | (in thousands of dollars) |             |                    |                    |                    |
| University (Postdoctorates)     | 1983 | 19.5                      | 20.2        | 4.6                |                    |                    |
| University <sup>(a)</sup>       | 1985 | 30.6                      | 31.3        | 7.1                | 33                 | 21                 |
| University (not Postdoctorates) | 1983 | 33.6                      | 39.4        | 17.0               |                    |                    |
| University                      | 1985 | 45.0                      | 49.9        | 25.3               | 40                 | 41                 |
| University                      | 1983 | 21.4                      | 24.8        | 8.3                |                    |                    |
| Industry                        | 1985 | 43.7                      | 46.6        | 18.4               | 35                 | 33                 |
| Industry                        | 1983 | 45.0                      | 49.1        | 14.6               |                    |                    |
| Industry                        | 1985 | 55.0                      | 59.0        | 19.7               | 42                 | 87                 |
| Government & FFR&DC             | 1983 | 44.1                      | 48.1        | 18.9               |                    |                    |
| Industry                        | 1985 | 55.0                      | 61.3        | 31.8               | 44                 | 20                 |

<sup>(a)</sup> 4 of these PhDs were still postdocs in 1985.

**SALARY**  
(in Thousands of Dollars)

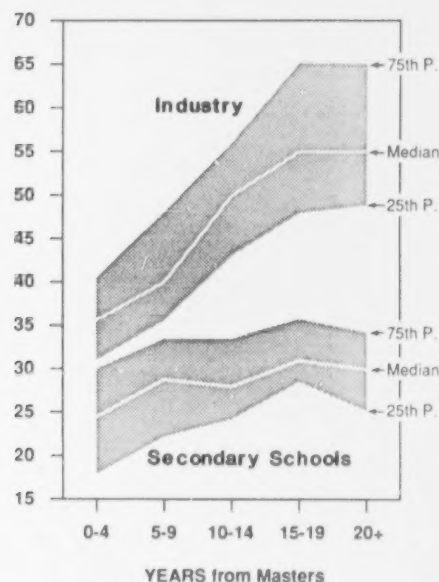


Figure 13. Salary structure in industry and secondary schools by years from Masters degree, 1985.

**MEDIAN SALARY**  
(in Thousands of Dollars)

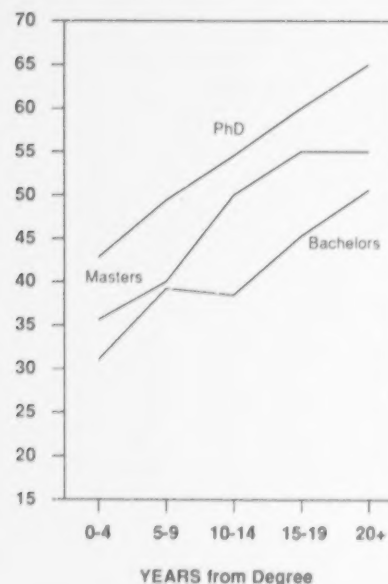


Figure 14. Median salaries in industry by degree level and years from degree, 1985.

## SALARIES FOR MASTERS AND BACHELORS

- Society members who hold masters degrees are chiefly employed by industry (41%) or secondary schools (17%). Three-quarters of the society members who work in secondary schools hold masters degrees.
- Among the sectors that employ a large number of masters, high schools pay the lowest with a median salary of \$30,000. By contrast, industry, government and the national laboratories pay their masters a median of \$45,000 or better. Masters in hospitals earn a somewhat lower median salary (\$40,000) but have, as a group, been in the labor market 5–10 years less than their colleagues in other sectors.

- Secondary school teachers' salaries are beginning to make significant headway, particularly at the entry level. Median salaries for masters degree holders with less than 10 years of experience have increased 8–10% per year for the last two years. Salaries increased less at the advanced experience levels as the ceiling for high school teachers edged up to about \$35,000.
- It should be noted that comparatively few high school teachers in physics and related sciences have less than 10 years of experience. It will be important to see whether the increases in entry level salaries have an appreciable effect on recruiting more teachers into this profession.

Table 18. 1985 salaries by selected employment sector, Masters.

|                           | Median Salary | Mean Salary<br>(in thousands of dollars) | Standard Deviation | Median Age | Total Number Known |
|---------------------------|---------------|------------------------------------------|--------------------|------------|--------------------|
| Junior College            | 33.0          | 32.4                                     | 5.7                | 49         | 55                 |
| Secondary School Teachers | 30.0          | 28.7                                     | 7.2                | 46         | 131                |
| Industry/Self-Employed    | 48.9          | 51.2                                     | 22.5               | 42         | 341                |
| Government                | 44.9          | 45.9                                     | 11.6               | 46         | 88                 |
| FFR&DC                    | 42.5          | 42.5                                     | 13.4               | 43         | 36                 |
| Hospital                  | 40.0          | 43.5                                     | 15.0               | 37         | 49                 |

Table 19. 1985 salaries by selected employment sector and years from degree, Masters.

|                                     | Years from Degree | QUARTILE SALARIES<br>(in thousands of dollars) |        |      | Mean Salary | Standard Deviation | Total      |              |
|-------------------------------------|-------------------|------------------------------------------------|--------|------|-------------|--------------------|------------|--------------|
|                                     |                   | 25th                                           | Median | 75th |             |                    | Median Age | Number Known |
| Secondary School<br>(Teachers only) | 0-4               | 18.0                                           | 23.3   | 30.0 | 23.3        | 7.8                | 36         | 14           |
|                                     | 5-9               | 22.3                                           | 28.8   | 33.4 | 27.5        | 8.2                | 40         | 16           |
|                                     | 10-14             | 24.5                                           | 28.0   | 33.0 | 28.5        | 6.2                | 44         | 27           |
|                                     | 15-19             | 28.6                                           | 31.0   | 35.7 | 31.4        | 6.2                | 46         | 37           |
|                                     | 20 +              | 25.3                                           | 30.0   | 34.2 | 28.7        | 7.4                | 55         | 36           |
| Industry/Self-Employed              | 0-4               | 31.1                                           | 35.6   | 40.5 | 37.5        | 13.6               | 30         | 50           |
|                                     | 5-9               | 35.6                                           | 40.0   | 48.0 | 42.1        | 10.6               | 33         | 78           |
|                                     | 10-14             | 43.1                                           | 50.0   | 56.0 | 52.3        | 19.8               | 38         | 44           |
|                                     | 15-19             | 48.0                                           | 55.0   | 65.1 | 59.6        | 31.2               | 43         | 44           |
|                                     | 20 +              | 48.9                                           | 55.0   | 65.0 | 59.5        | 23.7               | 56         | 120          |

Table 20. 1985 industrial salaries by years from degree, Bachelors.

|       | Median Salary | Mean Salary<br>(in thousands of dollars) | Standard Deviation | Median Age | Total Number Known |
|-------|---------------|------------------------------------------|--------------------|------------|--------------------|
| 0-4   | 31.0          | 31.9                                     | 6.4                | 26         | 31                 |
| 5-9   | 39.2          | 39.9                                     | 9.8                | 30         | 53                 |
| 10-14 | 38.5          | 40.8                                     | 12.6               | 35         | 35                 |
| 15-19 | 45.3          | 50.5                                     | 22.8               | 41         | 23                 |
| 20 +  | 50.6          | 56.7                                     | 22.4               | 56         | 100                |

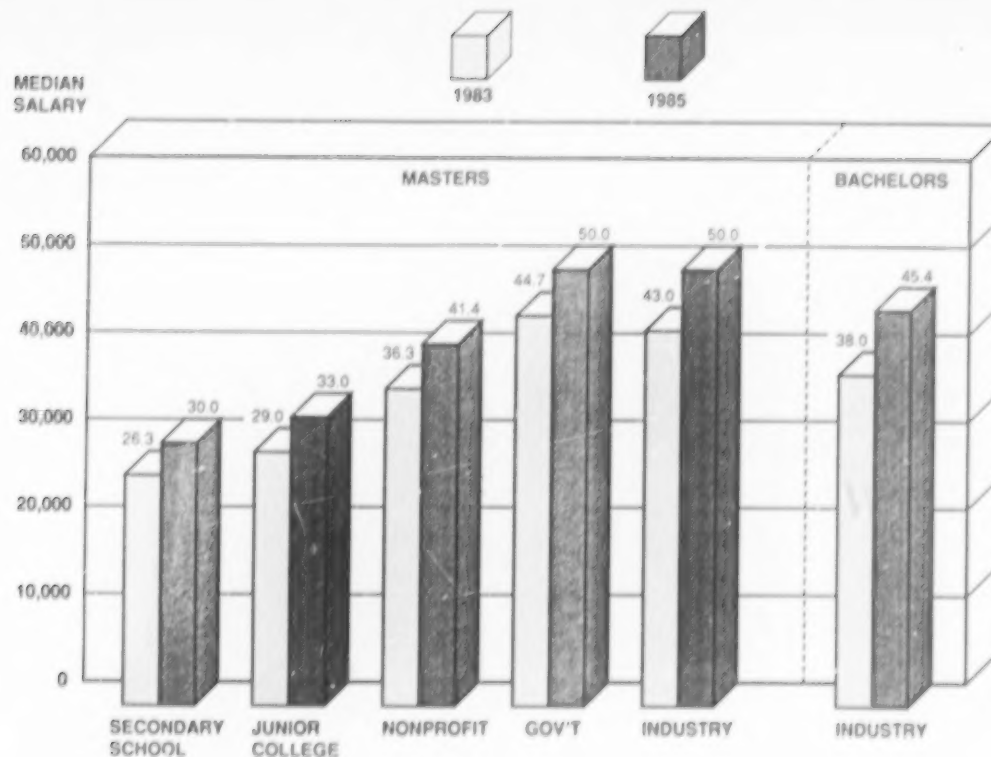


Figure 15. 1983 and 1985 median salaries by employment sector for Masters and Bachelors remaining with the same employer.

- Despite the size of the salary increase for high school teachers, industrially employed masters still get paid substantially more. In fact, the median entry level salary for masters in industry is \$35,000, which is as much as the most experienced high school teachers currently earn.
- Two-thirds of all society members who hold a bachelors degree are employed in industry. Another 9% each teach in the high schools or work for the government.

Table 21. 1983 and 1985 salaries for members continuing with the same employer within selected employment sectors, Masters and Bachelors.

|                                     | Year | Median<br>Salary | Mean<br>Salary<br><br>(in thousands of dollars) | Standard<br>Deviation | Median<br>Age in<br>1985 | Total<br>Number<br>Known |
|-------------------------------------|------|------------------|-------------------------------------------------|-----------------------|--------------------------|--------------------------|
| Masters                             |      |                  |                                                 |                       |                          |                          |
| Secondary School<br>(Teachers only) | 1983 | 26.3             | 26.0                                            | 6.0                   | 48                       | 87                       |
|                                     | 1985 | 30.0             | 30.0                                            | 6.9                   |                          |                          |
| Junior College                      | 1983 | 29.0             | 28.0                                            | 5.2                   | 48                       | 34                       |
|                                     | 1985 | 33.0             | 32.4                                            | 5.2                   |                          |                          |
| Industry                            | 1983 | 43.0             | 45.1                                            | 16.1                  | 46                       | 168                      |
|                                     | 1985 | 50.0             | 53.5                                            | 26.6                  |                          |                          |
| Government                          | 1983 | 44.7             | 44.9                                            | 9.7                   | 46                       | 58                       |
|                                     | 1985 | 50.0             | 50.4                                            | 10.2                  |                          |                          |
| Hospital & Nonprofit                | 1983 | 36.3             | 37.6                                            | 9.4                   | 40                       | 31                       |
|                                     | 1985 | 41.4             | 44.1                                            | 14.7                  |                          |                          |
| Bachelors                           |      |                  |                                                 |                       |                          |                          |
| Industry                            | 1983 | 38.0             | 43.1                                            | 24.0                  | 48                       | 119                      |
|                                     | 1985 | 45.4             | 49.0                                            | 18.6                  |                          |                          |

- Changes in median salary for bachelors and masters who stayed with the same employer from March 1983 to March 1985 vary according to employment sector. Masters employed with the government received the lowest percentage salary increase, however this was nearly double the inflation rate for that period.
- Among the lower degree holders, those employed in industry earned the largest salary increases between 1983 and 1985. During that period median salaries for bachelors and masters increased 16 and 19%, respectively.
- At all levels of professional experience, industrially employed PhDs receive higher salaries than their colleagues with lower degrees. Salaries for masters and bachelors in industry are comparatively close the first ten years after receipt of the degree. However, salaries then diverge with additional professional experience.

**SALARY**  
(in Thousands of Dollars)

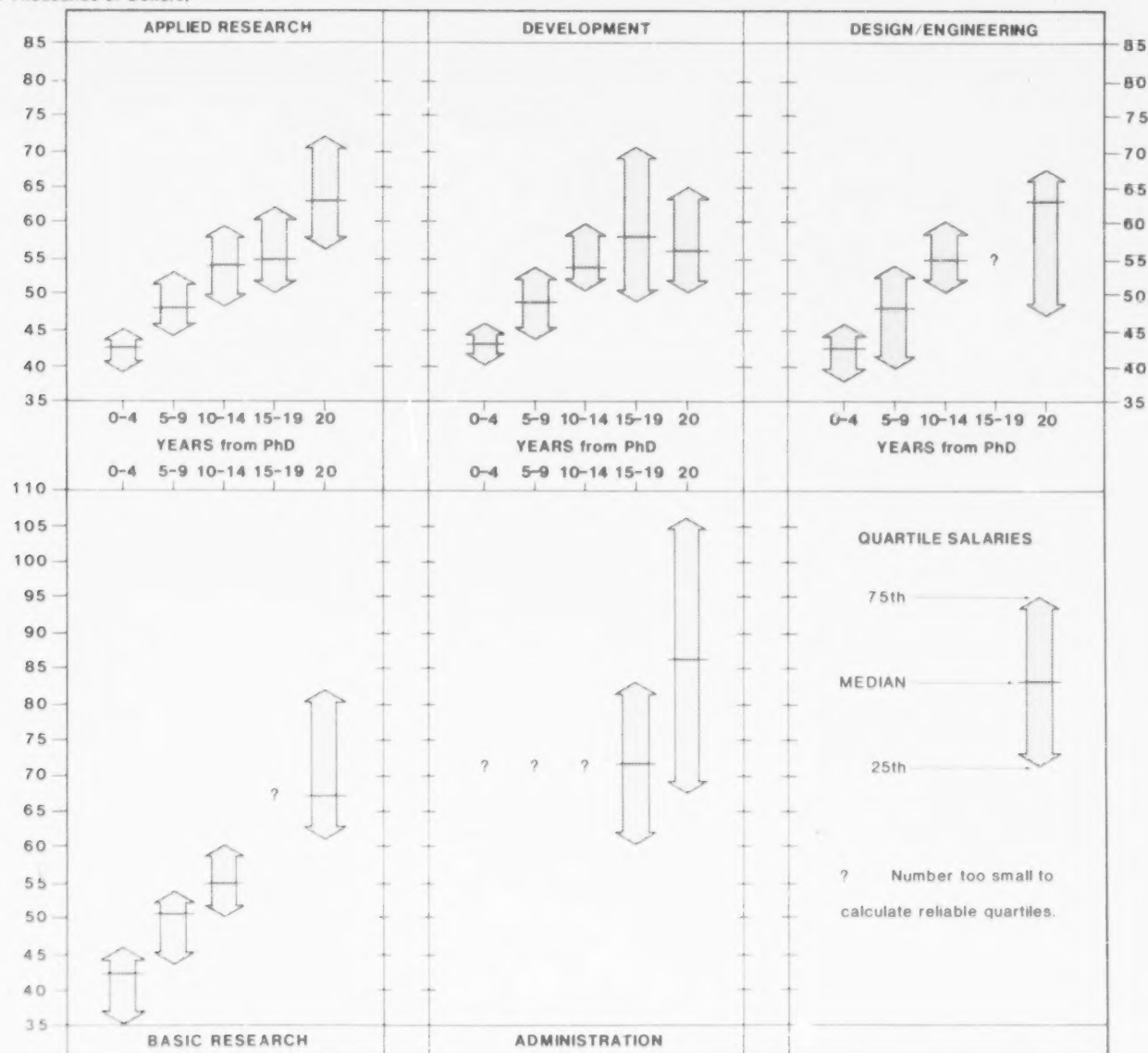


Figure 16. Industrial salaries by primary work activity and years from PhD, 1985.

Table 22. 1985 Industrial salaries by primary work activity and years from degree, PhDs.

| Years from Degree  | 25th | QUARTILE SALARIES<br>Median<br>(in thousands of dollars) | 75th  | Mean Salary | Standard Deviation | Median Age | Total Number Known |
|--------------------|------|----------------------------------------------------------|-------|-------------|--------------------|------------|--------------------|
| Basic Research     |      |                                                          |       |             |                    |            |                    |
| 0-4                | 35.0 | 42.0                                                     | 46.0  | 42.9        | 11.1               | 31         | 30                 |
| 5-9                | 43.5 | 50.7                                                     | 54.0  | 50.4        | 9.0                | 34         | 30                 |
| 10-14              | 50.0 | 55.0                                                     | 60.0  | 55.8        | 9.2                | 39         | 24                 |
| 15-19              | *    | *                                                        | *     | *           | *                  | *          | *                  |
| 20 +               | 60.9 | 67.0                                                     | 82.0  | 72.9        | 19.1               | 55         | 31                 |
| Applied Research   |      |                                                          |       |             |                    |            |                    |
| 0-4                | 39.0 | 42.4                                                     | 45.2  | 42.6        | 6.6                | 31         | 92                 |
| 5-9                | 44.0 | 48.0                                                     | 53.0  | 48.9        | 7.3                | 36         | 103                |
| 10-14              | 48.0 | 54.0                                                     | 59.5  | 55.4        | 12.6               | 41         | 78                 |
| 15-19              | 49.9 | 55.0                                                     | 62.1  | 58.6        | 15.5               | 45         | 60                 |
| 20 +               | 56.3 | 63.0                                                     | 72.0  | 65.8        | 15.0               | 56         | 78                 |
| Development        |      |                                                          |       |             |                    |            |                    |
| 0-4                | 40.0 | 42.9                                                     | 45.9  | 43.5        | 5.7                | 32         | 30                 |
| 5-9                | 43.6 | 48.8                                                     | 53.7  | 49.3        | 8.5                | 36         | 41                 |
| 10-14              | 50.0 | 53.4                                                     | 59.7  | 54.3        | 8.4                | 43         | 40                 |
| 15-19              | 48.6 | 58.0                                                     | 70.5  | 68.1        | 37.3               | 45         | 29                 |
| 20 +               | 50.0 | 56.0                                                     | 65.0  | 58.3        | 13.1               | 56         | 39                 |
| Design/Engineering |      |                                                          |       |             |                    |            |                    |
| 0-4                | 37.6 | 42.3                                                     | 45.9  | 42.9        | 8.8                | 33         | 21                 |
| 5-9                | 39.5 | 48.0                                                     | 54.0  | 47.6        | 8.4                | 35         | 29                 |
| 10-14              | 50.0 | 55.0                                                     | 60.0  | 56.4        | 12.3               | 40         | 21                 |
| 15-19              | *    | *                                                        | *     | *           | *                  | *          | *                  |
| 20 +               | 46.9 | 63.0                                                     | 67.5  | 59.9        | 16.1               | 53         | 23                 |
| Administration     |      |                                                          |       |             |                    |            |                    |
| 0-4                | *    | *                                                        | *     | *           | *                  | *          | *                  |
| 5-9                | *    | *                                                        | *     | *           | *                  | *          | *                  |
| 10-14              | *    | *                                                        | *     | *           | *                  | *          | *                  |
| 15-19              | 60.0 | 71.6                                                     | 83.2  | 72.4        | 15.5               | 44         | 38                 |
| 20 +               | 67.5 | 86.0                                                     | 106.0 | 89.6        | 33.9               | 56         | 55                 |

\*Number of respondents was too small to calculate reliable statistics.

## SALARIES AND PRIMARY WORK ACTIVITY

● Median PhD starting salaries in industry, ranging from \$42,000 to \$43,000, are relatively consistent across work activities. Those engaged in non-administrative activities maintain comparable salary levels throughout their careers, while scientists shifting into administration profit by earning well over 20% more than those remaining outside administration.

● Individuals in industry typically move into administration later in their careers; 42% of all administrators have 20 years or more experience. Scientists working in applied research or design/engineering are most likely to make this move. Those doing basic research are least likely.

Table 23. 1983 and 1985 salaries for members continuing in the same primary work activity, PhDs.

|                    | Year | Median<br>Salary<br>(in thousands of dollars) | Mean<br>Salary<br>(in thousands of dollars) | Standard<br>Deviation | Median<br>Age in<br>1985 | Total<br>Number<br>Known |
|--------------------|------|-----------------------------------------------|---------------------------------------------|-----------------------|--------------------------|--------------------------|
| Teaching           | 1983 | 31.8                                          | 33.2                                        | 9.4                   |                          |                          |
|                    | 1985 | 36.8                                          | 38.6                                        | 11.2                  | 48                       | 574                      |
| Basic Research     | 1983 | 39.4                                          | 40.0                                        | 13.3                  |                          |                          |
|                    | 1985 | 46.7                                          | 47.6                                        | 14.9                  | 43                       | 764                      |
| Applied Research   | 1983 | 44.5                                          | 45.5                                        | 10.8                  |                          |                          |
|                    | 1985 | 51.0                                          | 53.3                                        | 12.6                  | 43                       | 517                      |
| Development        | 1983 | 45.0                                          | 46.3                                        | 11.1                  |                          |                          |
|                    | 1985 | 51.0                                          | 54.3                                        | 17.6                  | 44                       | 132                      |
| Design/Engineering | 1983 | 46.0                                          | 47.6                                        | 12.0                  |                          |                          |
|                    | 1985 | 54.0                                          | 55.6                                        | 12.9                  | 40                       | 66                       |
| Administration     | 1983 | 55.4                                          | 57.8                                        | 17.0                  |                          |                          |
|                    | 1985 | 63.6                                          | 67.1                                        | 22.8                  | 50                       | 242                      |

- Between 1983 and 1985, salary increases for society members across all work activities remained comfortably ahead of inflation. Percentage increases were largest for PhD scientists engaged in basic research or design/engineering, masters level scientists working in design/engineering, and bachelors degree holders involved in teaching.

- At all degree levels, administrators reported among the smallest percentage salary increases, yet they continue to earn considerably more than their non-administrative peers. At the bachelors degree level, for example, teachers earned an 18% salary increase between 1983 and 1985 while administrators earned only 9%. Yet teachers reported a median salary in 1985 of \$23,500, less than half the median salary of \$56,000 paid to administrators.

- Caution should be taken when interpreting salary data for lower degree holders. The relatively small number of nonstudent masters and bachelors who belong to AIP Member Societies may not be representative of all lower degree holders with physics or related science and engineering backgrounds.

Table 24. 1983 and 1985 salaries for members continuing in the same primary work activity, Masters.

|                    | Year | Median Salary             | Mean Salary | Standard Deviation | Median Age in 1985 | Total Number Known |
|--------------------|------|---------------------------|-------------|--------------------|--------------------|--------------------|
|                    |      | (in thousands of dollars) |             |                    |                    |                    |
| Teaching           | 1983 | 27.0                      | 26.7        | 6.0                |                    |                    |
|                    | 1985 | 30.8                      | 30.6        | 6.6                | 49                 | 156                |
| Applied Research   | 1983 | 43.0                      | 44.6        | 14.7               |                    |                    |
|                    | 1985 | 49.4                      | 51.2        | 16.1               | 49                 | 64                 |
| Development        | 1983 | 41.8                      | 41.5        | 8.3                |                    |                    |
|                    | 1985 | 47.2                      | 47.6        | 10.2               | 44                 | 64                 |
| Design/Engineering | 1983 | 38.0                      | 39.3        | 11.2               |                    |                    |
|                    | 1985 | 44.7                      | 46.3        | 12.9               | 40                 | 58                 |
| Administration     | 1983 | 49.0                      | 50.8        | 18.9               |                    |                    |
|                    | 1985 | 54.7                      | 62.0        | 38.9               | 52                 | 60                 |

Table 25. 1983 and 1985 salaries for members continuing in the same primary work activity, Bachelors.

|                    | Year | Median Salary             | Mean Salary | Standard Deviation | Median Age in 1985 | Total Number Known |
|--------------------|------|---------------------------|-------------|--------------------|--------------------|--------------------|
|                    |      | (in thousands of dollars) |             |                    |                    |                    |
| Teaching           | 1983 | 20.0                      | 20.3        | 4.7                |                    |                    |
|                    | 1985 | 23.5                      | 23.6        | 5.7                | 39                 | 24                 |
| Applied Research   | 1983 | 38.0                      | 37.7        | 10.7               |                    |                    |
|                    | 1985 | 43.3                      | 44.2        | 12.2               | 50                 | 37                 |
| Development        | 1983 | 39.6                      | 42.2        | 15.6               |                    |                    |
|                    | 1985 | 43.0                      | 48.5        | 17.7               | 47                 | 31                 |
| Design/Engineering | 1983 | 35.9                      | 38.2        | 10.7               |                    |                    |
|                    | 1985 | 41.0                      | 45.3        | 11.7               | 48                 | 44                 |
| Administration     | 1983 | 53.2                      | 58.7        | 35.0               |                    |                    |
|                    | 1985 | 58.0                      | 63.0        | 22.8               | 54                 | 38                 |

Table 26. 1985 industrial salaries by sex and years from degree.

| Years from Degree | Median Salary | Mean Salary<br>(in thousands of dollars) | Standard Deviation | Median Age | Total Number Known |
|-------------------|---------------|------------------------------------------|--------------------|------------|--------------------|
| 0-4               |               |                                          |                    |            |                    |
| Male              | 40.7          | 41.1                                     | 10.3               | 31         | 237                |
| Female            | 39.5          | 38.1                                     | 10.6               | 32         | 30                 |
| 5-9               |               |                                          |                    |            |                    |
| Male              | 46.7          | 47.0                                     | 10.6               | 35         | 346                |
| Female            | 42.0          | 43.8                                     | 12.1               | 34         | 25                 |
| 10 +              |               |                                          |                    |            |                    |
| Male              | 57.0          | 61.0                                     | 23.0               | 48         | 977                |
| Female            | 45.0          | 47.3                                     | 17.4               | 41         | 25                 |

Table 27. 1983 and 1985 salaries by sex and major employment sector.

|             | Year |        | Median Salary | Mean Salary<br>(in thousands of dollars) | Standard Deviation | Median Age in 1985 | Total Number Known |
|-------------|------|--------|---------------|------------------------------------------|--------------------|--------------------|--------------------|
| Academic    | 1983 | Male   | 32.9          | 35.1                                     | 11.8               |                    |                    |
|             |      | Female | 27.8          | 29.1                                     | 10.5               |                    |                    |
|             | 1985 | Male   | 38.8          | 41.5                                     | 14.5               | 47                 | 1370               |
|             |      | Female | 34.5          | 34.1                                     | 11.2               | 46                 | 76                 |
| Nonacademic | 1983 | Male   | 45.4          | 47.5                                     | 14.6               |                    |                    |
|             |      | Female | 40.0          | 39.5                                     | 11.3               |                    |                    |
|             | 1985 | Male   | 52.0          | 55.3                                     | 17.9               | 44                 | 1762               |
|             |      | Female | 47.1          | 47.2                                     | 13.5               | 39                 | 90                 |

## SALARIES FOR MALES AND FEMALES

● In 1985 men continued to earn higher salaries than women, although the disparity has been steadily decreasing. Using the longitudinal sample, we can examine the changing salaries of men and women who continued to be full-time employed during the early 1980's. In 1981, women's salaries lagged behind men's by 25% in academe and 16% outside academe. Since that time, women have consistently received proportionally larger salary increases than their male colleagues, decreasing this gap in 1985 to 12% and 10%, respectively.

● In industry, the disparity between the salary levels of men and women increases with experience. At entry-level, women earn on the average only 3% less than men, while at the most experienced level the gap grows to 27%. This reflects, in part, the varying male and female age distributions. At the most senior level of experience women are considerably younger than men, while at less experienced levels women's median age is on par with men. The difference in salary level at the most experienced level is also rooted in the differing career paths taken by male and female scientists. Women are less likely than men to be engaged in such lucrative work activities as administration.

## APPENDIX A: GEOGRAPHIC DIVISIONS

### NEW ENGLAND

Connecticut  
Maine  
Massachusetts  
New Hampshire  
Rhode Island  
Vermont

### MIDDLE ATLANTIC

New Jersey  
New York  
Pennsylvania

### SOUTH ATLANTIC

Delaware  
District of Columbia  
Florida  
Georgia  
Maryland  
North Carolina  
South Carolina  
Virginia  
West Virginia  
Puerto Rico

### EAST NORTH CENTRAL

Illinois  
Indiana  
Michigan  
Ohio  
Wisconsin

### EAST SOUTH CENTRAL

Alabama  
Kentucky  
Mississippi  
Tennessee

### WEST NORTH CENTRAL

Iowa  
Kansas  
Minnesota  
Missouri  
Nebraska  
North Dakota  
South Dakota

### WEST SOUTH CENTRAL

Arkansas  
Louisiana  
Oklahoma  
Texas

### MOUNTAIN

Arizona  
Colorado  
Idaho  
Montana  
Nevada  
New Mexico  
Utah  
Wyoming

### PACIFIC

Alaska  
California  
Hawaii  
Oregon  
Washington

## APPENDIX B: TECHNICAL NOTES

### Median

The median, a measure that is frequently used in this report, is that point in a distribution above and below which 50% of the values fall. Since it is less influenced by extreme values than the arithmetic mean, it is the preferred descriptive measure of central tendency in typically skewed salary and age distributions. In most of the tables, both median and mean salaries are presented; observed differences reflect the skewness in the distributions.

### Quantile Calculations

The P-STAT statistical package was used to compute the medians and other quantiles presented in the salary tables and figures. It should be noted

that this package works with an ordered distribution of value points. In such an ordered distribution, the median, for example, equals the central point in an odd-numbered distribution and a weighted value between the two middle points in an even-number distribution.

### Quantiles and Interquantile Ranges

Ninety percent of the values in a distribution fall below the ninth decile, seventy-five percent below the third quartile, twenty-five percent below the first quartile and ten percent below the first decile. The interdecile and interquartile ranges, which indicate differences between deciles and between quartiles, are measures of variation within distributions and are used in several of this report's figures.

## Employment Base

Salary data are presented for current society members who are employed full-time in the U.S. Some separate but limited information on Canadian residents is also provided. Students are not included.

## Sampling Error

The salary figures in this report may be affected by different sources of error. Society members who did not respond may have had somewhat different salaries than those who did respond, thus introducing response bias. Although earlier surveys in this series estimated that the effects of response bias were minor, the possible effect remains. A fuller explanation of response bias is presented in the methodological appendices of the membership profiles.

Since the data in this report are based upon a small random sample, they are also subject to sampling error. The variability introduced by the sampling procedure depends both on the size of the sub-group being examined, and the variation of values in the population. The formulas below present conservative estimates of the standard error based on simple random sampling. When standard errors were calculated, taking into account the minor stratification by society used in the sampling, slightly lower estimates resulted. Confidence intervals for proportions, means and medians can be determined as follows:

### Medians:

$M_1$ , that point below which  $p_1^*$  values fall.

$M_2$ , that point below which  $p_2^*$  values fall.

where

$$p_1 = p + Z \left( \frac{p(1-p)}{n} \right)^{1/2}, \quad p_2 = p - Z \left( \frac{p(1-p)}{n} \right)^{1/2},$$

and

$$p = 0.5,$$

$n$  = sample size,

$Z$  = coefficient of confidence, 1.96 at the 95% confidence level.

### Means:

$$\bar{x} \pm Zs/(n)^{1/2}, \text{ where}$$

$\bar{x}$  = the arithmetic mean,

$s$  = standard deviation,

$n$  = sample size, and

$Z$  = coefficient of confidence 1.96 at the 95% confidence level.

### Proportions:

$$p \pm Z \left( \frac{p(1-p)}{n} \right)^{1/2}$$

$p$  = sample proportion observed,

$n$  = sample size, and

$Z$  = coefficient of confidence, 1.96 at the 95% confidence level.

## Standardization

In one analytic section of this report standardization techniques were used to control on related variables that effect salary levels. To examine directly the impact of regional variation on salaries, variation in employer type was controlled. Employer-adjusted average salaries for each region were calculated by applying the nationwide employer distribution to the employer-specific mean salaries within each region.

## Cost of Living Index

The cost of living index used in this report was developed by the American Chamber of Commerce Researchers' Association (ACCRA). Its purpose is to provide "a useful and reasonably accurate measurement of inter-city cost of living differences." The index measures "relative price levels for consumer goods and services in participating cities, as compared with the national average for all participating cities (metropolitan and nonmetropolitan)." Differences of more than three index whole numbers in the All-items index can be considered to represent actual inter-city differences in the cost of consumer goods and services; but the percentage difference in such cases should be considered a reasonable indication, rather than a precise measure, of the extent of the differences.

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New York, NY 10017-3483

# APPREPORT

EDUCATION & EMPLOYMENT  
STATISTICS DIVISION

Tel. 212-661-9404

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10/17/88

## 1986 SALARIES: SOCIETY MEMBERSHIP SURVEY



## THE AMERICAN INSTITUTE OF PHYSICS

The American Institute of Physics is a not-for-profit membership corporation chartered in New York State in 1931 for the purpose of promoting the advancement and diffusion of knowledge in physics and its application to human welfare.

It is the mission of the Institute to serve the sciences of physics and astronomy by serving the Societies, by serving individual scientists, and by serving students and the general public.

### The Institute

- publishes its own scientific journals as well as those of its Member Societies;
- publishes both technical and general-interest books;
- provides abstracting and indexing services;
- serves the public by making available to the press and other channels of public information reliable communications on physics and astronomy;
- collects and analyzes statistics on the profession and on physics education;
- encourages and assists in the documentation and study of the history and philosophy of physics;
- cooperates with local, national, and international organizations devoted to physics and related sciences; and
- collects and distributes information on Federal programs and budgets.

The scientists represented by the Institute through its Member Societies number approximately 89,000. In addition, approximately 7,600 students in over 555 colleges and universities are members of the Institute's Society of Physics Students, which includes the honor society, Sigma Pi Sigma. Industry is represented through some 100 Corporate Associates members. AIP's monthly magazine, *PHYSICS TODAY*, reaches all these people and organizations.

The Education and Employment Statistics Division provides reliable information on the composition and dynamics of the scientific labor force and education system to the physics community for use in self-assessment. Its program involves regular data collection and analysis, information dissemination, and report publication.

## MEMBER SOCIETIES

The American Physical Society  
Optical Society of America  
Acoustical Society of America  
The Society of Rheology  
American Association of Physics Teachers  
American Crystallographic Association  
American Astronomical Society  
American Association of Physicists in Medicine  
American Vacuum Society  
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# **1986 SALARIES: SOCIETY MEMBERSHIP SURVEY**

**W. Keith Skelton, Dawn Kellman, and Roman Czujko**

**The American Physical Society  
Optical Society of America  
Acoustical Society of America  
The Society of Rheology  
American Association of Physics Teachers  
American Crystallographic Association  
American Astronomical Society  
American Association of Physicists in Medicine  
American Vacuum Society  
American Geophysical Union**

## COVER

This figure illustrates the variation in median salaries by state of residence. California and several states in the sunbelt and along the eastern coast maintain the greatest concentration of society members and the highest PhD salaries in the nation. Heavy representation of industry, government, and national laboratories within these states, and the higher salaries associated with such employment, account for the salary distribution found within these areas. States where relatively low salaries are observed (the Plains and Southeastern states) generally have relatively few society members, most of whom are academically employed. Where shading is absent, there are too few society members to report reliable median salaries.

Median salaries for PhD society members resident in the Canadian provinces of Quebec and Ontario in the accompanying figure are presented in Canadian dollars. The salaries in Quebec are somewhat lower, partly reflecting the heavier academic composition of the members residing there.



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## INTRODUCTION

### Background

"1986 Salaries: Society Membership Survey" is the fourth in a series of reports produced by the Education and Employment Statistics division of AIP. Initiated in 1982, the series provides reliable nationwide data on the salaries of members of AIP Member Societies. In the past, employers, those testifying before Congress and society members-at-large have found this kind of resource useful.

### Methodology

The data presented here are based on a stratified random sample survey of one-sixth of the U.S. and Canadian membership of the AIP Member Societies. This sampling frame oversamples the smaller societies so that each of the ten<sup>1</sup> AIP Member Societies are equally well represented. Each year, the survey follows-up on previous respondents and expands to include a sampling of new members. In this way, the survey maintains access to the changing trends associated with the growth of the member societies. Those eligible for inclusion in the 1986 sample had memberships which were current as of December 1985.

In the spring of 1986, every individual in our sample received a questionnaire in which they were asked to describe their employment in March of 1986. The brief, one-page form asked for such information as work activity, level of highest degree, salary, and type of employer. A postage-paid return envelope was provided. Several weeks after the initial mailing, a second wave of questionnaires was mailed to those sample members who had not yet returned a completed form. Of the approximately 12,000 society members who were mailed a questionnaire, 64% responded.

### Results

Overall, the picture that emerges is a positive one. Members' salaries easily outpaced inflation, which was at a record low (2.3%) in 1986. The median salary for society members climbed 6.6% from the previous year, to \$47,000. Society members with a PhD, who comprise over three-quarters of the membership, fared even better. They earned a median annual salary of \$49,500, which represents a 7.6% increase.

Despite this, salary levels continued to vary considerably. The figures, tables and text that follow describe in detail salary variation by geographic location, employer, level of highest degree, primary work activity, and sex. For those seeking aggregate data not found in this report, the division has

MEDIAN SALARY<sup>1</sup>  
(In Thousands of Dollars)



Figure 1. Median salaries for PhDs, 1979–1986. Both reported salaries and salaries adjusted for inflation are presented.

statistical resources that may be of value. Please contact the division for more information on special requests.

Most of the discussion in this document centers on median and quartile salaries, which are the preferred descriptive measures of central tendency and variation in typically skewed salary distributions. The tables also present salary means and standard deviations, as well as median ages, which are useful for comparative analyses. Please consult Appendix B for definitions and technical notes on the measures used in this report.

### Caveats

While the majority of this report describes the various salary structures found in March 1986, salary changes between 1985 and 1986 will also be

<sup>1</sup>While the American Geophysical Union is now a Member Society of AIP, it was not at the time of this survey.

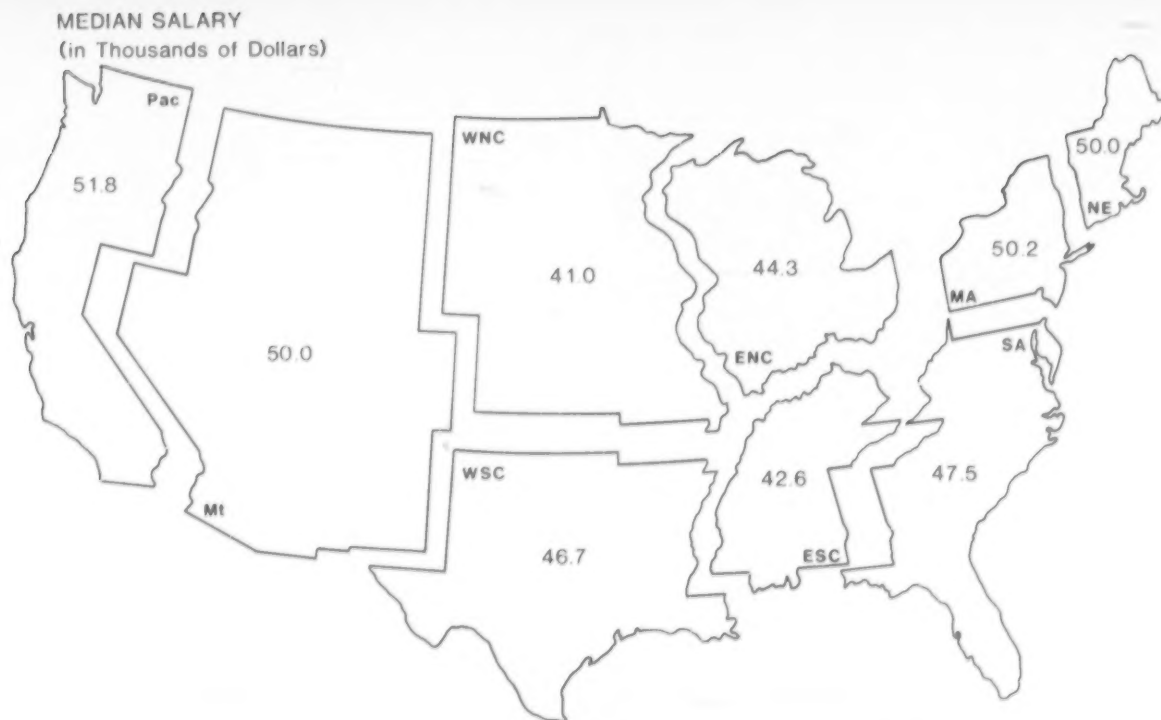


Figure 2. Variation in median salary for PhDs by geographic division, 1986.

mentioned. For the most part, these comparisons will be cross sectional, e.g., the 1985 median salary of industrially employed PhDs will be compared with the median salary of industrially employed PhDs in 1986. From the point of view of employers, this kind of comparison reflects the "going rate" for such personnel, but caution must be exercised. Cross-sectional analyses reflect net salary changes and are sensitive to any movement into or out of that particular subgroup, such as an influx of young employees, or retirements. For employers and society members seeking data on typical salary increases they may be misleading.

One final note: salary tables discussing lower-degree holders must be interpreted with caution. According to the National Science Foundation (NSF), of all physicists employed in 1986, 21% held only a Masters degree

and 23% held only a Bachelors degree. By contrast, 18% of our membership holds only a Masters degree and 8% only a Bachelors. Thus, lower degree holders are poorly represented in the membership. Those who are members tend to be atypical, with a special interest in specific society programs.

### SALARIES AND GEOGRAPHIC LOCATION FOR PhDs

- The three main factors that dictate the salary levels found throughout the United States are (1) the distribution of employment sectors within each division, (2) the salary structure for each employer type, and (3) the inter-divisional age variations.

Table 1. 1986 salaries by geographic division, PhDs.<sup>(a)</sup>

|                       | Median Salary | Mean Salary<br>(in thousands of dollars) | Standard Deviation | Median Age | Total Number Known |
|-----------------------|---------------|------------------------------------------|--------------------|------------|--------------------|
| New England           | 50.0          | 52.0                                     | 19.6               | 44         | 323                |
| Middle Atlantic       | 50.2          | 53.2                                     | 20.7               | 44         | 693                |
| South Atlantic        | 47.5          | 49.5                                     | 16.9               | 45         | 613                |
| East North Central    | 44.3          | 46.3                                     | 16.3               | 45         | 466                |
| East South Central    | 42.6          | 43.9                                     | 12.0               | 46         | 136                |
| West North Central    | 41.0          | 43.5                                     | 16.3               | 44         | 133                |
| West South Central    | 46.7          | 49.5                                     | 17.4               | 45         | 200                |
| Mountain              | 50.0          | 49.9                                     | 16.4               | 44         | 334                |
| Pacific               | 51.8          | 54.4                                     | 20.5               | 44         | 735                |
| Canada <sup>(b)</sup> | 52.0          | 53.0                                     | 16.2               | 45         | 141                |

<sup>(a)</sup> See Appendix A for state composition of each division.<sup>(b)</sup> Canadian salaries are reported in Canadian dollars. One U.S. dollar = 1.43 Canadian dollars.

Table 2. 1986 salaries by selected employment sector and geographic division, PhDs.

|                    | Academic      |            |    | Industry      |            |    | Other         |            |    |
|--------------------|---------------|------------|----|---------------|------------|----|---------------|------------|----|
|                    | Median Salary | Median Age | %  | Median Salary | Median Age | %  | Median Salary | Median Age | %  |
| New England        | 43.0          | 46         | 52 | 58.3          | 43         | 31 | 51.8          | 43         | 17 |
| Middle Atlantic    | 41.3          | 47         | 43 | 58.7          | 42         | 46 | 50.8          | 45         | 11 |
| South Atlantic     | 40.0          | 46         | 41 | 54.0          | 43         | 16 | 52.0          | 45         | 43 |
| East North Central | 40.0          | 47         | 62 | 52.0          | 40         | 20 | 48.0          | 44         | 18 |
| East South Central | 36.0          | 47         | 55 | *             | *          | *  | 52.0          | 45         | 39 |
| West North Central | 37.6          | 45         | 68 | 49.5          | 39         | 25 | *             | *          | *  |
| West South Central | 40.0          | 47         | 57 | 56.0          | 42         | 36 | *             | *          | *  |
| Mountain           | 38.0          | 46         | 36 | 57.0          | 43         | 16 | 53.1          | 43         | 48 |
| Pacific            | 44.0          | 46         | 33 | 56.0          | 42         | 40 | 54.0          | 43         | 27 |
| Overall            | 40.0          | 46         | 46 | 56.0          | 42         | 29 | 52.0          | 44         | 25 |

\*Number of respondents was too small to calculate reliable medians.

● From one region of the country to the next, median salaries for industrially employed members are consistently higher than those in other employment sectors. Salary differences between academically employed society members and those working in industry represent the greatest disparity, with salary differences ranging from \$11,900 in the West North Central to \$19,000 in the Mountain States. In addition, academically employed members are three to seven years older than those in industry. The distribution of states within each division can be found in Appendix A.

● Though the industrial median salary in the Pacific division falls in line with the national average for that employment sector, salaries within academe and the National Laboratories are the highest in the country. Consequently, society members employed on the Pacific coast maintain the highest overall median salary at \$51,800. One should note that nearly 90% of the membership who live in the Pacific Division reside in California. The large population of members in California therefore overshadows the influence that Washington, Oregon, Hawaii and Alaska have on divisional statistics.

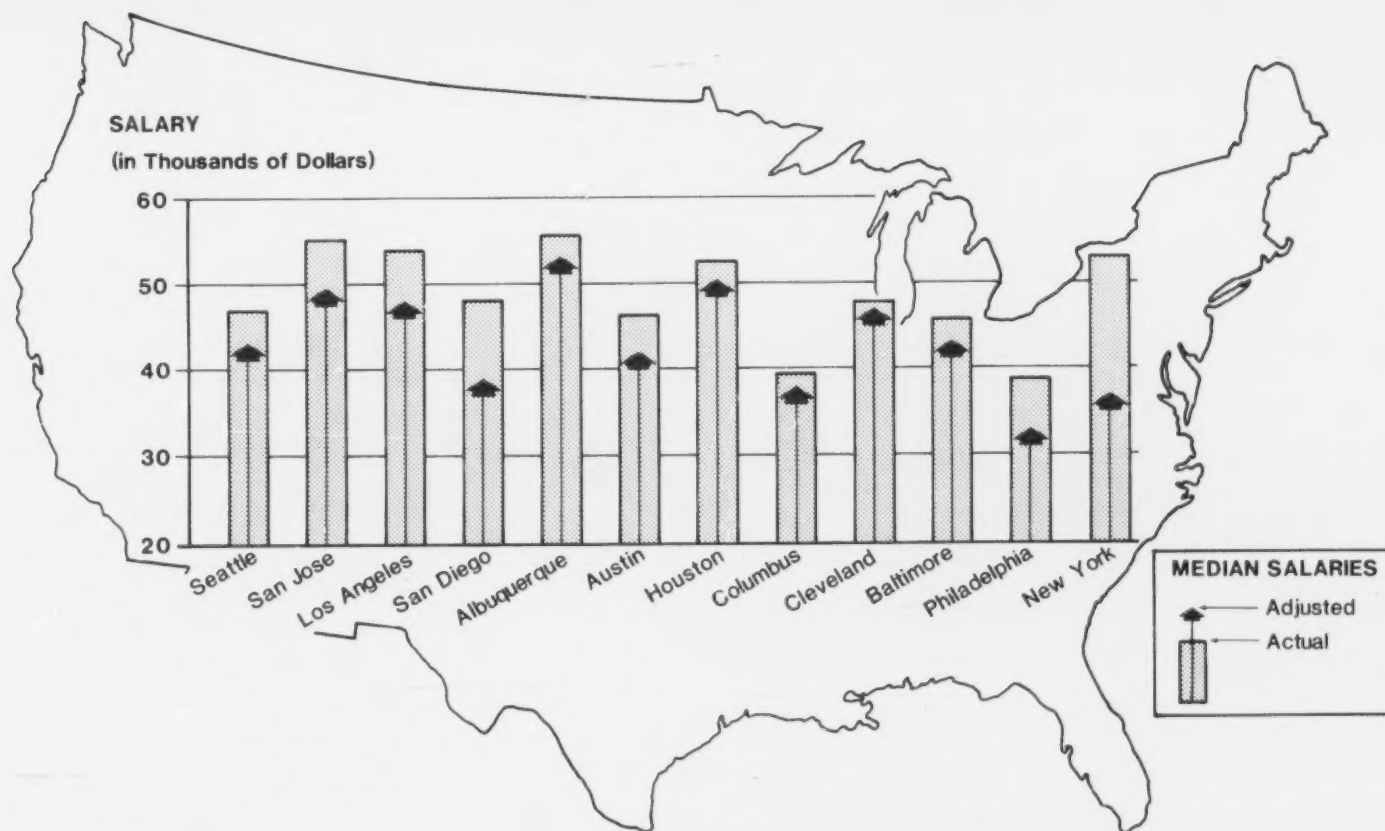


Figure 3. Median salaries for PhDs in 12 metropolitan areas, 1986. Both actual salaries and salaries adjusted for cost of living are presented.

- The lowest overall salary is observed in the West North Central at \$41,000. This is primarily a result of the large proportion of academically employed society members earning the lowest PhD salaries in the nation.
- Industrially employed society members residing in New England and the Middle Atlantic states command the highest salaries in the nation, in excess of \$58,000 annually.

- The cities listed in Table 3 all volunteered to participate in a survey developed by the American Chamber of Commerce Researchers Association. The questionnaire was developed to "provide a useful and reasonably accurate measurement of inter-city cost of living differences." The cost of living index represents a market basket of goods and services for the first quarter of 1986. Certain cities (Chicago, Washington D.C., San Francisco, and others) are notably absent from the list due to a lack of response to the survey.

Table 3. 1986 median salaries adjusted for cost of living in selected metropolitan areas, PhDs.<sup>(a)</sup>

|              | Cost of Living Index | Median Salary | Adjusted Salary | Median Age | Academic % | Non-Academic % | Total Number Known |
|--------------|----------------------|---------------|-----------------|------------|------------|----------------|--------------------|
| Albuquerque  | 104.4                | 55.6          | 53.3            | 43         | 13         | 87             | 52                 |
| Austin       | 110.4                | 46.5          | 42.1            | 44         | 76         | 24             | 29                 |
| Baltimore    | 105.9                | 46.0          | 43.4            | 43         | 49         | 51             | 35                 |
| Cleveland    | 101.6                | 48.0          | 47.2            | 41         | 32         | 68             | 22                 |
| Columbus     | 103.9                | 39.6          | 38.1            | 46         | 75         | 25             | 36                 |
| Houston      | 104.7                | 52.6          | 50.2            | 43         | 43         | 57             | 46                 |
| Los Angeles  | 112.3                | 54.0          | 48.1            | 44         | 30         | 70             | 130                |
| New York     | 142.0                | 53.0          | 37.3            | 47         | 47         | 53             | 113                |
| Philadelphia | 117.9                | 39.0          | 33.1            | 43         | 60         | 40             | 40                 |
| San Diego    | 122.7                | 48.3          | 39.4            | 45         | 36         | 64             | 50                 |
| San Jose     | 111.2                | 55.0          | 49.5            | 41         | 28         | 72             | 42                 |
| Seattle      | 108.8                | 47.0          | 43.2            | 40         | 58         | 42             | 20                 |

<sup>(a)</sup> Cost of Living Index from the American Chamber of Commerce Researchers Association, national average = 100.0

Adjusted salary =  $\frac{\text{Median Salary}}{\text{cost of living \%}}$

- There is a direct relationship between the size of a metropolitan area and the cost of living. In general, society members reside in larger, more expensive, urban centers where employment opportunities are more likely to be found for physicists with advanced training. As a consequence, all of the cities listed in Table 3 have a higher cost of living index than the national average (100).

- During the 1985–1986 academic year only seven states produced more advanced physics degrees than the universities in the single city of Philadelphia, Pennsylvania. The presence of a large number of prestigious institutions in this metropolitan area results in an over-representation of society members working in academe. The generally lower salaries earned by academicians, as compared to colleagues in other sectors, produces a unweighted median salary \$10,000 less than the national average. This fact in conjunction with the high cost of living in Philadelphia results in the lowest adjusted median salary among all cities listed in Table 3.

- Philadelphians can take heart in that their colleagues working in nearby New York City are living in one of the most expensive cities in the United States. PhD society members living in the New York metropolitan area have

a median salary \$3,500 above the national median. While this initially appears attractive, members making the \$53,000 median salary in New York earn an adjusted salary \$12,000 less than the national median. In addition society members in New York are, in general, older than their colleagues in other cities.

- Albuquerque, New Mexico, Houston, Texas and San Jose, California are the only cities listed in Table 3 that maintain adjusted salaries at or above the national median of \$49,500. While Albuquerque and Houston maintain a relatively low cost of living, the high salaries observed in all three cities are a function of the over-representation of members employed in industry or at the National Laboratories. Houston and San Jose members are concentrated in the industrial sector. In general, those residing in San Jose are working for "High Tech" firms while those in Houston are employed at petroleum-related corporations. The majority of members residing in Albuquerque work for Sandia National Laboratories, a Federally Funded Research and Development Center (FFR&DC). In 1986, the median salary for PhDs employed at National Laboratories was \$53,000, \$3,500 over the national median and second only to industry.

Table 4. 1986 salaries and employment sector distribution for selected states and Canadian provinces, PhDs.<sup>(a)</sup>

|                | Median<br>Salary<br>(in thousands of dollars) | Mean<br>Salary<br>(in thousands of dollars) | Standard<br>Deviation | Median<br>Age | Total<br>Number<br>Known | Academic<br>% | Industry<br>% | Gov't<br>% | FFR&DC <sup>(b)</sup><br>% | Other<br>% |
|----------------|-----------------------------------------------|---------------------------------------------|-----------------------|---------------|--------------------------|---------------|---------------|------------|----------------------------|------------|
| Alabama        | 41.5                                          | 44.7                                        | 11.4                  | 47            | 28                       | 70            | 7             | 19         | -                          | 4          |
| Arizona        | 42.0                                          | 44.4                                        | 15.4                  | 44            | 49                       | 65            | 17            | 4          | 10                         | 4          |
| California     | 52.8                                          | 55.4                                        | 20.6                  | 43            | 662                      | 30            | 41            | 4          | 21                         | 4          |
| Northern       | 53.9                                          | 56.3                                        | 22.6                  | 43            | 316                      | 26            | 34            | 4          | 29                         | 7          |
| Southern       | 52.3                                          | 54.6                                        | 18.5                  | 44            | 345                      | 34            | 47            | 3          | 13                         | 3          |
| Colorado       | 46.7                                          | 48.7                                        | 17.8                  | 44            | 92                       | 50            | 29            | 14         | 6                          | 1          |
| Connecticut    | 50.0                                          | 52.4                                        | 26.6                  | 44            | 69                       | 53            | 35            | 8          | -                          | 4          |
| Delaware       | 45.3                                          | 48.8                                        | 13.3                  | 42            | 22                       | 35            | 61            | -          | -                          | 4          |
| DC             | 55.7                                          | 55.2                                        | 13.5                  | 46            | 147                      | 5             | 2             | 88         | -                          | 5          |
| Florida        | 41.2                                          | 44.2                                        | 15.2                  | 46            | 48                       | 72            | 13            | 10         | -                          | 5          |
| Georgia        | 48.0                                          | 46.9                                        | 17.8                  | 45            | 40                       | 81            | 17            | -          | -                          | 2          |
| Illinois       | 44.0                                          | 47.5                                        | 17.8                  | 44            | 160                      | 52            | 17            | -          | 28                         | 3          |
| Indiana        | 41.2                                          | 45.2                                        | 15.0                  | 47            | 52                       | 84            | 14            | -          | -                          | 2          |
| Iowa           | 37.6                                          | 40.6                                        | 19.8                  | 45            | 26                       | 86            | -             | -          | 12                         | 2          |
| Kansas         | 39.0                                          | 41.6                                        | 19.2                  | 45            | 20                       | 95            | 5             | -          | -                          | -          |
| Louisiana      | 40.4                                          | 43.1                                        | 12.3                  | 48            | 22                       | 82            | 14            | -          | -                          | 4          |
| Maryland       | 47.5                                          | 48.3                                        | 15.1                  | 43            | 162                      | 31            | 23            | 39         | 3                          | 4          |
| Massachusetts  | 51.5                                          | 52.8                                        | 17.1                  | 43            | 221                      | 50            | 30            | 11         | 5                          | 4          |
| Michigan       | 42.6                                          | 47.7                                        | 18.4                  | 45            | 85                       | 63            | 30            | 2          | -                          | 5          |
| Minnesota      | 45.0                                          | 47.5                                        | 15.1                  | 40            | 39                       | 36            | 63            | -          | -                          | 1          |
| Missouri       | 42.0                                          | 45.2                                        | 15.7                  | 44            | 28                       | 64            | 28            | 3          | -                          | 5          |
| New Jersey     | 55.0                                          | 59.0                                        | 20.4                  | 42            | 204                      | 19            | 72            | 2          | 6                          | 1          |
| New Mexico     | 53.4                                          | 55.0                                        | 14.6                  | 44            | 146                      | 9             | 7             | 6          | 76                         | 2          |
| New York       | 50.0                                          | 52.4                                        | 21.0                  | 45            | 341                      | 51            | 36            | 1          | 7                          | 5          |
| Northern       | 48.0                                          | 51.1                                        | 21.9                  | 45            | 180                      | 59            | 37            | 1          | 1                          | 2          |
| Southern       | 50.8                                          | 54.0                                        | 19.9                  | 45            | 161                      | 42            | 35            | -          | 14                         | 9          |
| North Carolina | 43.0                                          | 45.4                                        | 19.6                  | 45            | 50                       | 79            | 11            | 4          | -                          | 6          |
| Ohio           | 47.4                                          | 46.0                                        | 13.3                  | 46            | 121                      | 60            | 20            | 10         | 3                          | 7          |
| Oklahoma       | 45.1                                          | 49.0                                        | 17.0                  | 43            | 21                       | 46            | 48            | 4          | -                          | 2          |
| Pennsylvania   | 46.0                                          | 47.1                                        | 18.2                  | 45            | 147                      | 60            | 31            | 5          | -                          | 4          |
| Tennessee      | 46.6                                          | 45.4                                        | 12.0                  | 45            | 85                       | 42            | 6             | -          | 51                         | 1          |
| Texas          | 49.0                                          | 51.3                                        | 18.2                  | 44            | 147                      | 52            | 41            | 1          | -                          | 6          |
| Utah           | 42.5                                          | 43.2                                        | 16.7                  | 45            | 22                       | 82            | 16            | -          | -                          | 2          |
| Virginia       | 48.0                                          | 52.8                                        | 20.0                  | 46            | 105                      | 47            | 23            | 18         | 6                          | 6          |
| Washington     | 46.0                                          | 47.1                                        | 17.7                  | 43            | 41                       | 51            | 40            | -          | 9                          | -          |
| Wisconsin      | 37.8                                          | 41.3                                        | 15.4                  | 44            | 47                       | 80            | 17            | -          | -                          | 3          |
| Ontario        | 53.7                                          | 52.8                                        | 15.4                  | 45            | 61                       | 61            | 12            | 26         | -                          | 1          |
| Quebec         | 50.0                                          | 51.6                                        | 19.3                  | 45            | 29                       | 90            | 10            | -          | -                          | -          |

<sup>(a)</sup> Several states were not included above because the number of respondents was too small to calculate reliable statistics.

<sup>(b)</sup> Federally Funded Research and Development Center.

Table 5. 1986 salaries by major employment sector, PhDs.

|                        | Median Salary | Mean Salary<br>(in thousands of dollars) | Standard Deviation | Median Age | Total Number Known |
|------------------------|---------------|------------------------------------------|--------------------|------------|--------------------|
| University             |               |                                          |                    |            |                    |
| 9-10 Month Salary      | 41.0          | 43.5                                     | 13.1               | 49         | 811                |
| 11-12 Month Salary     | 45.0          | 46.5                                     | 19.0               | 43         | 514                |
| 4-Year Colleges        |               |                                          |                    |            |                    |
| 9-10 Month Salary      | 31.6          | 32.8                                     | 8.2                | 46         | 134                |
| Industry/Self-Employed | 56.0          | 59.9                                     | 19.7               | 42         | 1049               |
| Government             | 51.5          | 51.5                                     | 11.9               | 46         | 344                |
| FFR&DC                 | 53.0          | 54.0                                     | 14.5               | 43         | 431                |
| Nonprofit              | 50.0          | 54.0                                     | 30.2               | 43         | 92                 |
| Hospital               | 53.0          | 56.2                                     | 19.5               | 45         | 47                 |

Table 6. 1986 salaries by years from degree, PhDs.

| Years from Degree | Median Salary | Mean Salary<br>(in thousands of dollars) | Standard Deviation | Median Age | Total Number Known |
|-------------------|---------------|------------------------------------------|--------------------|------------|--------------------|
| 0-4               | 35.4          | 35.3                                     | 11.0               | 32         | 483                |
| 5-9               | 43.6          | 43.8                                     | 13.3               | 36         | 611                |
| 10-14             | 50.0          | 49.8                                     | 15.5               | 41         | 638                |
| 15-19             | 51.0          | 53.1                                     | 17.1               | 45         | 677                |
| 20-24             | 54.0          | 56.1                                     | 18.2               | 50         | 505                |
| 25-29             | 57.7          | 60.0                                     | 18.2               | 55         | 322                |
| 30 +              | 60.1          | 62.7                                     | 23.7               | 62         | 381                |

## SALARIES AND EMPLOYMENT SECTOR FOR PhDs

- In 1986 the median salary for PhDs rose to \$49,500, a 7.6% increase from 1985. During the same period, the national inflation rate slowed to 2.3%, its lowest point in eight years. This translated into a real increase in take-home-pay for PhD society members.
- Salary levels vary across employment sectors. For example, a scientist working at a four-year college will, for the most part, earn considerably less than a colleague with the same amount of experience working in government. The variation in salary level between sectors begins at the lowest levels of experience and continues throughout a professional career.

- A recent doctorate entering the labor force can expect to command the highest starting salary by entering the private sector. In 1986 the median industrial starting salary reached \$44,300. By comparison, those starting their careers in national laboratories received a somewhat lower median starting salary of \$42,000, those in government \$37,000.

- At all levels of experience, industrially employed PhDs receive the highest salaries. The best paid industrial PhDs, those at the highest level of experience, commanded salaries of \$100,000 or more in 1986. The self-employed are among these top wage earners.

**MEDIAN SALARY**  
(in Thousands of Dollars)

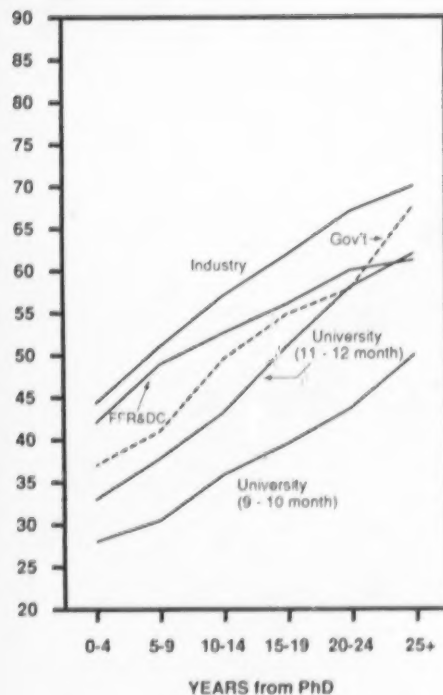


Figure 4. Median salaries by type of employer and years from PhD, 1986.

**SALARY**  
(in Thousands of Dollars)

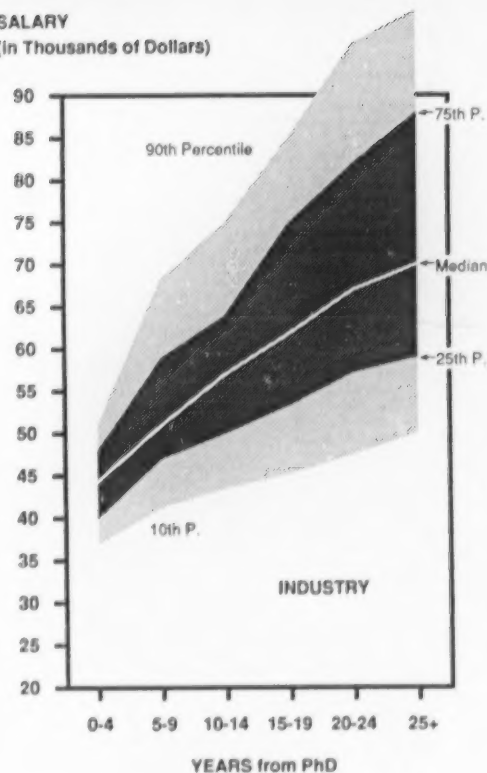


Figure 5. Salary structure in industry by years from PhD, 1986.

**SALARY**  
(in Thousands of Dollars)

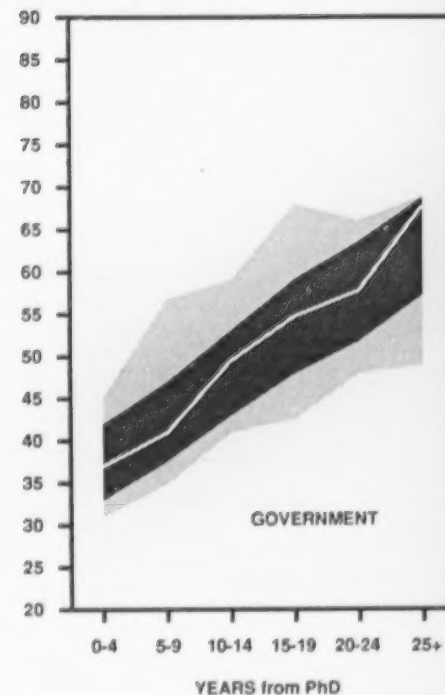


Figure 6. Salary structure in government by years from PhD, 1986.

- Median academic salaries continue to fall short of salaries paid to PhDs outside academe. In 1986, overall median academic salaries ranged from \$31,600 in four-year colleges to \$45,000 in universities.

- Across all employment sectors, salaries climb with professional experience. Yet each sector has its own unique salary distribution. In industry,

salaries are clustered within a narrow range at entry-level but broaden considerably with experience. Typical industrial salaries vary by as little as \$8,000 at entry-level and by as much as \$29,000 at the highest level of experience. The broad salary range is due, in large part, to the multiple career paths available in industry, paths ranging from bench scientist to corporate executive.

Table 7. 1986 industrial salary structure by years from degree, PhDs.<sup>(a)</sup>

| Years from Degree | 10th | 25th | PERCENTILE SALARIES       |      | 90th  | Mean Salary | Standard Deviation | Median Age | Total Number Known |
|-------------------|------|------|---------------------------|------|-------|-------------|--------------------|------------|--------------------|
|                   |      |      | Median                    | 75th |       |             |                    |            |                    |
|                   |      |      | (in thousands of dollars) |      |       |             |                    |            |                    |
| 0-4               | 37.0 | 40.0 | 44.3                      | 48.0 | 51.0  | 44.6        | 8.2                | 32         | 156                |
| 5-9               | 41.3 | 47.0 | 51.0                      | 59.0 | 68.2  | 53.5        | 11.2               | 36         | 228                |
| 10-14             | 43.5 | 50.0 | 57.0                      | 64.0 | 75.0  | 58.7        | 14.4               | 41         | 200                |
| 15-19             | 45.2 | 53.3 | 61.8                      | 75.0 | 85.0  | 64.7        | 16.8               | 45         | 184                |
| 20-24             | 47.5 | 57.2 | 67.0                      | 82.0 | 96.0  | 71.8        | 24.7               | 50         | 107                |
| 25 +              | 50.0 | 59.0 | 70.0                      | 88.0 | 100.0 | 74.8        | 25.3               | 59         | 153                |

<sup>(a)</sup> In addition, there were 12 postdoctorates with a median salary of \$37,000.

Table 8. 1986 government salary structure by years from degree, PhDs.<sup>(a)</sup>

| Years from Degree | 10th | 25th | PERCENTILE SALARIES       |      | 90th | Mean Salary | Standard Deviation | Median Age | Total Number Known |
|-------------------|------|------|---------------------------|------|------|-------------|--------------------|------------|--------------------|
|                   |      |      | Median                    | 75th |      |             |                    |            |                    |
|                   |      |      | (in thousands of dollars) |      |      |             |                    |            |                    |
| 0-4               | 31.0 | 33.0 | 37.0                      | 42.0 | 45.0 | 38.3        | 7.8                | 32         | 30                 |
| 5-9               | 35.0 | 37.6 | 41.0                      | 47.0 | 56.8 | 43.4        | 8.6                | 39         | 46                 |
| 10-14             | 41.0 | 43.0 | 49.5                      | 53.1 | 59.0 | 49.0        | 6.9                | 42         | 73                 |
| 15-19             | 42.6 | 48.0 | 54.8                      | 59.2 | 68.0 | 54.1        | 8.4                | 46         | 62                 |
| 20-24             | 48.0 | 51.8 | 57.8                      | 63.6 | 66.0 | 57.5        | 8.3                | 50         | 51                 |
| 25 +              | 49.0 | 57.3 | 67.7                      | 68.7 | 68.9 | 62.6        | 9.6                | 60         | 69                 |

<sup>(a)</sup> In addition, there were 10 postdoctorates with a median salary of \$26,300.

- Government salaries are dictated, to a large extent, by the structure of the civil service grades. According to the Office of Personnel Management, government employees across all degree levels who worked in physics in 1986 were, on the average, in General Schedule Grade 13. Except at the highest level of experience, government workers are still paid well below industry rates and there is increasing pressure within the public sector to be more competitive with industry.

- In the past, government employees have typically received "comparability" increases. These are percentage increases given to federal employees to narrow the gap between government and industrial salaries. However, according to the Advisory Committee on Federal Pay, in 1986 "the civilian work force pay was frozen at the January 1985 level." Thus, while some individuals may have received salary increases in 1986, the overall increase across individuals was kept at zero.

**SALARY**  
(in Thousands of Dollars)

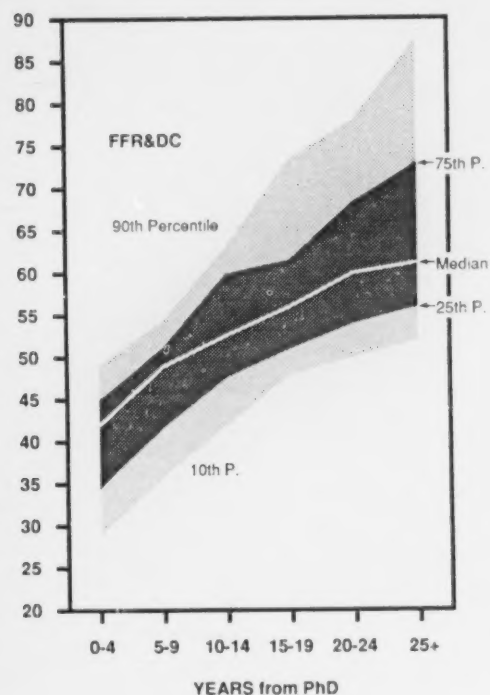


Figure 7. Salary structure in the national laboratories by years from PhD, 1986.

**SALARY**  
(in Thousands of Dollars)

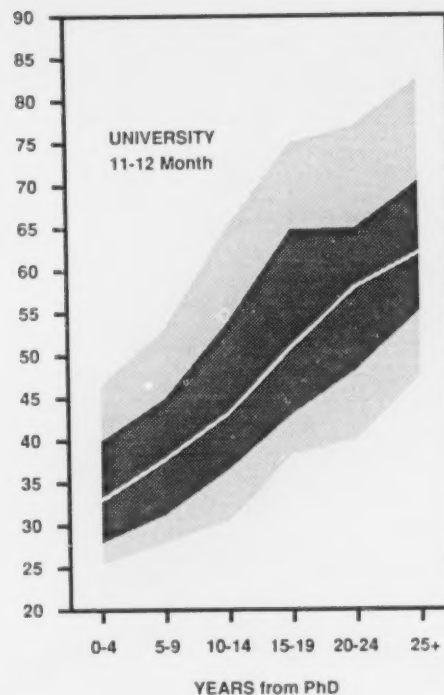


Figure 8. Salary structure in universities for 11-12 month salary base, by years from PhD, 1986.

**SALARY**  
(in Thousands of Dollars)

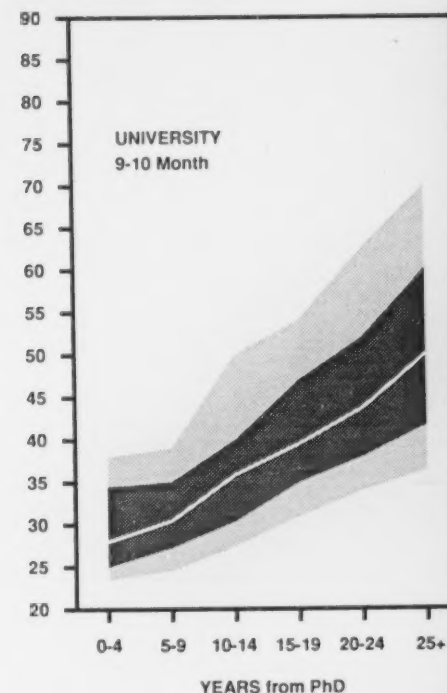


Figure 9. Salary structure in universities for 9-10 month salary base, by years from PhD, 1986.

- Salary ranges for those working on a 9-10 month salary base in universities are relatively narrow at each level of experience. More variability is observed in the university 11-12 month salaries, reflecting the wide range of academic positions including tenured and non-tenured staff, administrative personnel and professors receiving federal grants.

Table 9. 1986 FFR&DC salary structure by years from degree, PhDs.<sup>(a)</sup>

| Years from Degree | 10th | PERCENTILE SALARIES |                                     |      | 90th | Mean Salary | Standard Deviation | Median Age | Total Number Known |
|-------------------|------|---------------------|-------------------------------------|------|------|-------------|--------------------|------------|--------------------|
|                   |      | 25th                | Median<br>(in thousands of dollars) | 75th |      |             |                    |            |                    |
| 0-4               | 28.8 | 34.5                | 42.0                                | 45.0 | 49.0 | 40.4        | 7.5                | 32         | 40                 |
| 5-9               | 36.0 | 41.7                | 48.9                                | 51.2 | 54.3 | 46.9        | 7.9                | 36         | 68                 |
| 10-14             | 42.0 | 47.6                | 52.6                                | 60.0 | 63.0 | 53.0        | 9.5                | 40         | 85                 |
| 15-19             | 48.0 | 51.0                | 56.0                                | 61.6 | 73.4 | 58.0        | 10.1               | 45         | 94                 |
| 20-24             | 50.0 | 54.0                | 60.0                                | 68.4 | 78.0 | 61.8        | 10.3               | 50         | 56                 |
| 25 +              | 52.0 | 56.0                | 61.2                                | 73.0 | 87.5 | 66.4        | 16.9               | 58         | 67                 |

<sup>(a)</sup> In addition, there were 17 postdoctorates with a median salary of \$25,000.

Table 10. 1986 university 11-12 month salary structure by years from degree, PhDs.<sup>(a)</sup>

| Years from Degree | 10th | 25th | PERCENTILE SALARIES                 |      | 90th | Mean Salary | Standard Deviation | Median Age | Total Number Known |
|-------------------|------|------|-------------------------------------|------|------|-------------|--------------------|------------|--------------------|
|                   |      |      | Median<br>(in thousands of dollars) | 75th |      |             |                    |            |                    |
| 0-4               | 25.5 | 28.0 | 33.0                                | 40.0 | 46.5 | 34.3        | 9.0                | 32         | 37                 |
| 5-9               | 28.0 | 31.3 | 37.8                                | 45.0 | 53.0 | 39.1        | 10.2               | 36         | 81                 |
| 10-14             | 30.6 | 36.6 | 43.2                                | 54.0 | 65.0 | 46.2        | 14.0               | 41         | 78                 |
| 15-19             | 38.4 | 43.1 | 51.0                                | 64.9 | 75.0 | 56.3        | 20.4               | 45         | 81                 |
| 20-24             | 40.0 | 48.2 | 58.0                                | 65.0 | 77.0 | 57.7        | 13.9               | 50         | 67                 |
| 25 +              | 47.5 | 55.2 | 62.0                                | 70.5 | 82.5 | 64.1        | 13.6               | 58         | 83                 |

<sup>(a)</sup> In addition, there were 69 postdocs in the 0-4 years from degree group with known salaries working in universities on an 11-12 month salary base. Their median salary was \$23,000.

Table 11. 1986 university 9-10 month salary structure by years from degree, PhDs.<sup>(a)</sup>

| Years from Degree | 10th | 25th | PERCENTILE SALARIES                 |      | 90th | Mean Salary | Standard Deviation | Median Age | Total Number Known |
|-------------------|------|------|-------------------------------------|------|------|-------------|--------------------|------------|--------------------|
|                   |      |      | Median<br>(in thousands of dollars) | 75th |      |             |                    |            |                    |
| 0-4               | 23.5 | 25.0 | 28.0                                | 34.5 | 38.0 | 29.6        | 5.7                | 32         | 46                 |
| 5-9               | 24.6 | 27.3 | 30.5                                | 35.1 | 39.0 | 31.7        | 6.1                | 36         | 94                 |
| 10-14             | 27.5 | 30.4 | 35.9                                | 40.0 | 50.0 | 37.1        | 9.9                | 41         | 88                 |
| 15-19             | 31.0 | 35.0 | 39.5                                | 47.0 | 54.0 | 41.2        | 9.0                | 45         | 152                |
| 20-24             | 34.0 | 38.0 | 43.7                                | 52.0 | 62.5 | 46.1        | 10.8               | 49         | 170                |
| 25 +              | 36.4 | 41.7 | 50.0                                | 60.1 | 70.0 | 52.0        | 13.5               | 59         | 259                |

<sup>(a)</sup> Postdocs excluded

SALARY  
(in Thousands of Dollars)

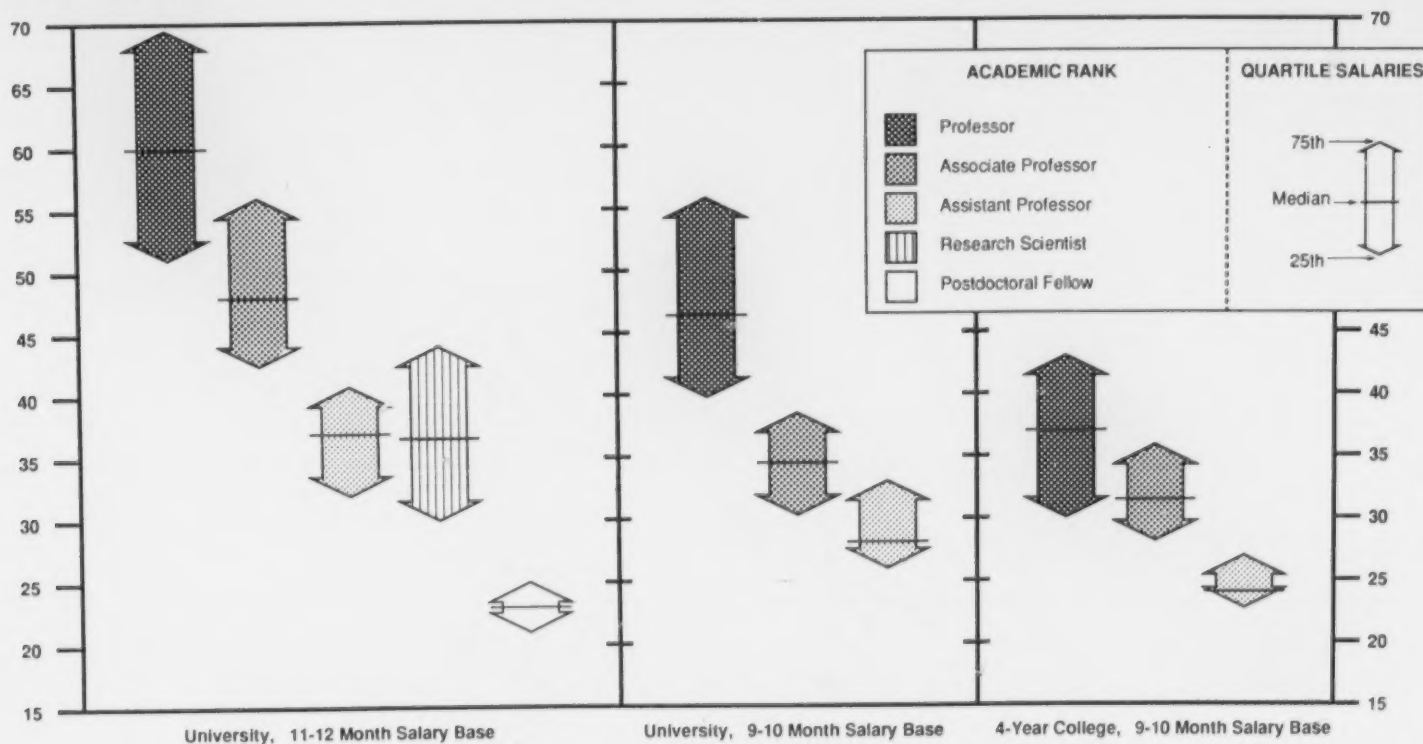


Figure 10. University and 4-year college salaries for PhDs by academic rank, 1986.

### Salaries and Academic Rank

- Nearly half of all society members with a PhD work in academe. In general, the bulk of the academically employed work in universities, are somewhat older than their non-academic peers, and earn salaries at a rate below those outside academe.
- During the past ten years, the percentage of assistant professors in universities has steadily declined. Consequently, the median age of the professoriate has increased to over 50. As the bulk of the university faculty reaches

retirement age in the 1990's, the impact of the aging of the professoriate will make itself felt.

- University professors employed on a 11-12 month salary base earned, on average, between \$51,100 and \$69,500 in 1986. The broad range reflects the variety of activities available to this group, including administration and grant-funded research.

Table 12. 1986 university salaries by selected academic rank and salary base, PhDs.

|                                         | 25th | QUARTILE SALARIES<br>Median<br>(in thousands of dollars) | 75th | Mean<br>Salary | Standard<br>Deviation | Median<br>Age | Total<br>Number<br>Known |
|-----------------------------------------|------|----------------------------------------------------------|------|----------------|-----------------------|---------------|--------------------------|
| Professor                               |      |                                                          |      |                |                       |               |                          |
| 9-10 month salary                       | 39.8 | 46.4                                                     | 55.8 | 48.6           | 12.1                  | 52            | 541                      |
| 11-12 month salary                      | 51.1 | 60.0                                                     | 69.5 | 61.4           | 14.7                  | 52            | 175                      |
| Associate Professor                     |      |                                                          |      |                |                       |               |                          |
| 9-10 month salary                       | 30.3 | 34.5                                                     | 38.5 | 34.9           | 6.2                   | 43            | 148                      |
| 11-12 month salary                      | 42.5 | 48.0                                                     | 56.0 | 51.7           | 17.7                  | 42            | 74                       |
| Assistant Professor                     |      |                                                          |      |                |                       |               |                          |
| 9-10 month salary                       | 26.0 | 28.1                                                     | 33.0 | 29.7           | 5.0                   | 34            | 107                      |
| 11-12 month salary                      | 32.0 | 37.0                                                     | 40.8 | 37.2           | 9.1                   | 35            | 61                       |
| Research Associate (11-12 month salary) |      |                                                          |      |                |                       |               |                          |
| Postdoctorates                          | 21.0 | 23.0                                                     | 25.0 | 23.3           | 3.4                   | 32            | 71                       |
| Other Research Staff                    | 30.0 | 36.6                                                     | 44.0 | 38.1           | 10.1                  | 39            | 55                       |

Table 13. 1986 4-year college salaries by selected academic rank on 9-10 month salary base, PhDs.

|                     | 25th | QUARTILE SALARIES<br>Median<br>(in thousands of dollars) | 75th | Mean<br>Salary | Standard<br>Deviation | Median<br>Age | Total<br>Number<br>Known |
|---------------------|------|----------------------------------------------------------|------|----------------|-----------------------|---------------|--------------------------|
| Professor           | 30.0 | 37.0                                                     | 43.0 | 37.3           | 8.7                   | 50            | 59                       |
| Associate Professor | 28.1 | 31.4                                                     | 35.8 | 31.7           | 5.5                   | 45            | 49                       |
| Assistant Professor | 22.7 | 24.0                                                     | 26.9 | 24.6           | 3.0                   | 36            | 25                       |

- The past two years have brought a sharp increase in the median salary paid to postdoctoral fellows. In 1986, postdocs earned a median salary of \$23,000, a 9.5% increase from the previous year.
- A new academic track has emerged during the past decade: the research scientist. Close in age to associate professors, research scientists earn salaries comparable to assistant professors, but in general have no tenure and fewer teaching responsibilities.
- Median salary levels in 4-year colleges ranged from \$24,000 to \$37,000 in 1986. This is 10-25% lower at each professorial rank than salaries earned by those employed in universities on a 9-10 month salary base.

**SALARY**  
(in Thousands of Dollars)

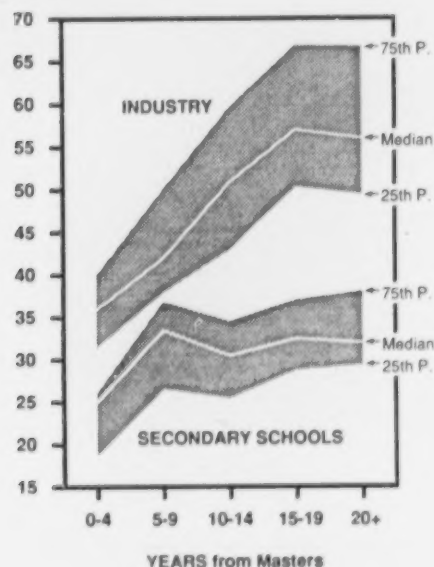


Figure 11. Salary structure in industry and secondary schools by years from Masters degree, 1986.

**MEDIAN SALARY**  
(in Thousands of Dollars)

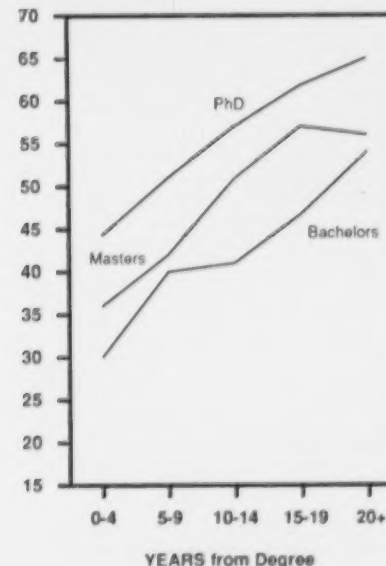


Figure 12. Median salaries in industry by degree level and years from degree, 1986.

## SALARIES FOR MASTERS AND BACHELORS

- Median salaries of masters degree holders working in industry and teaching in secondary schools, underscore one of the central problems facing the scientific community today. While salary is hardly the sole reason for a physicist's choice of employer, the tremendous salary differentials observed between industrial and secondary school employment, at every experience level, must be considered as a major factor affecting initial employer choice and later employment mobility.
- The disparity in median salaries observed between industry and secondary schools for masters degree holders ranges from \$11,000 for newly employed

members to \$24,000 for those with the most professional experience. It is therefore not surprising to find that of all the physics students granted masters degrees in 1986, and opting for employment, only 1% ended up working in the secondary school system while 32% procured jobs in industry.

- The only employment sector where comparisons between degree levels can be examined is industry. At all levels of professional experience, industrially employed PhDs receive higher salaries than their colleagues with lower degrees. In general, doctorates receive salaries \$4,800 to \$9,000 higher than society members holding masters degrees.

Table 14. 1986 salaries by selected employment sector, Masters.

|                           | Median Salary             | Mean Salary | Standard Deviation | Median Age | Total Number Known |
|---------------------------|---------------------------|-------------|--------------------|------------|--------------------|
|                           | (in thousands of dollars) |             |                    |            |                    |
| Junior College            | 34.0                      | 34.0        | 6.8                | 49         | 56                 |
| Secondary School Teachers | 30.7                      | 30.8        | 7.4                | 46         | 157                |
| Industry/Self-Employed    | 50.0                      | 52.6        | 20.7               | 43         | 332                |
| Government                | 43.5                      | 45.6        | 12.0               | 45         | 81                 |
| FFR&DC                    | 51.0                      | 48.8        | 11.7               | 47         | 33                 |
| Hospital                  | 42.0                      | 44.1        | 11.1               | 38         | 47                 |

Table 15. 1986 salaries by selected employment sector and years from degree, Masters.

|                                     | Years from Degree | 25th | QUARTILE SALARIES<br>Median<br>(in thousands of dollars) |  | 75th | Mean Salary | Standard Deviation | Median Age | Total Number Known |
|-------------------------------------|-------------------|------|----------------------------------------------------------|--|------|-------------|--------------------|------------|--------------------|
| Secondary School<br>(Teachers only) | 0-4               | 18.8 | 25.0                                                     |  | 26.0 | 23.1        | 6.2                | 37         | 18                 |
|                                     | 5-9               | 26.6 | 33.5                                                     |  | 36.8 | 32.6        | 8.0                | 41         | 20                 |
|                                     | 10-14             | 25.5 | 30.5                                                     |  | 34.5 | 29.8        | 6.4                | 44         | 37                 |
|                                     | 15-19             | 28.8 | 32.5                                                     |  | 37.0 | 32.8        | 6.0                | 44         | 39                 |
|                                     | 20 +              | 29.4 | 32.0                                                     |  | 38.0 | 32.3        | 7.6                | 54         | 41                 |
| Industry                            | 0-4               | 31.5 | 36.0                                                     |  | 40.0 | 36.5        | 8.8                | 29         | 47                 |
|                                     | 5-9               | 38.0 | 42.0                                                     |  | 50.0 | 45.2        | 12.1               | 33         | 71                 |
|                                     | 10-14             | 43.0 | 50.9                                                     |  | 59.5 | 52.5        | 17.8               | 38         | 53                 |
|                                     | 15-19             | 50.4 | 57.0                                                     |  | 66.8 | 62.7        | 30.9               | 44         | 33                 |
|                                     | 20 +              | 49.5 | 56.0                                                     |  | 66.7 | 60.1        | 20.9               | 56         | 123                |

Table 16. 1986 industrial salaries by years from degree, Bachelors.

|       | Median Salary             | Mean Salary | Standard Deviation | Median Age | Total Number Known |
|-------|---------------------------|-------------|--------------------|------------|--------------------|
|       | (in thousands of dollars) |             |                    |            |                    |
| 0-4   | 30.0                      | 31.0        | 6.8                | 27         | 39                 |
| 5-9   | 40.0                      | 41.4        | 7.4                | 31         | 49                 |
| 10-14 | 41.0                      | 44.7        | 13.6               | 36         | 27                 |
| 15-19 | 46.7                      | 55.9        | 26.5               | 41         | 18                 |
| 20 +  | 54.0                      | 60.6        | 29.0               | 56         | 89                 |

**SALARY**  
(in Thousands of Dollars)

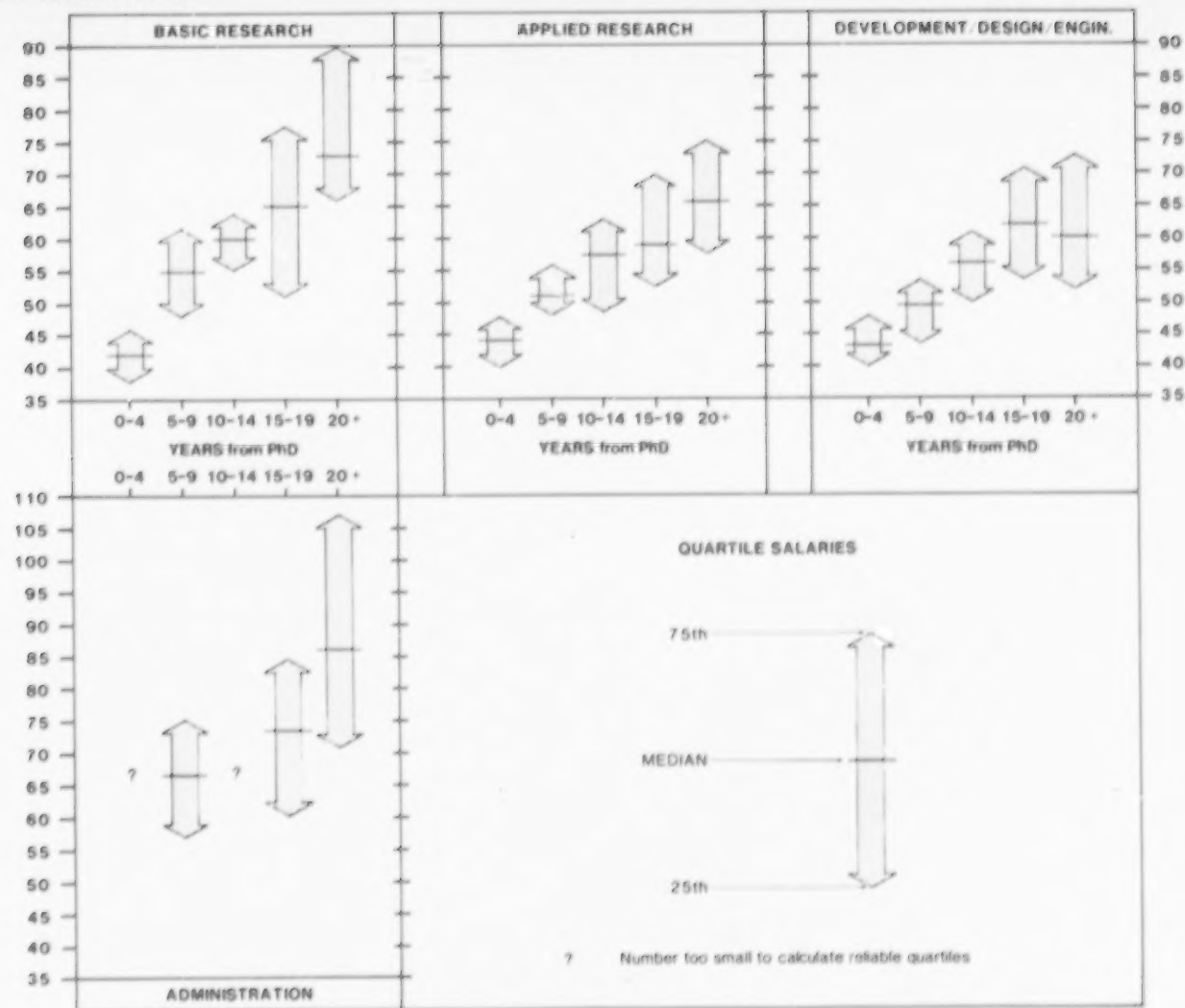


Figure 13. Industrial salaries by primary work activity and years from PhD, 1986.

**Table 17. 1986 Industrial salaries by primary work activity and years from degree, PhDs.**

| Years from Degree                          | 25th | QUARTILE SALARIES<br>Median<br>(in thousands of dollars) | 75th  | Mean Salary | Standard Deviation | Median Age | Total Number Known |
|--------------------------------------------|------|----------------------------------------------------------|-------|-------------|--------------------|------------|--------------------|
| <b>Basic Research</b>                      |      |                                                          |       |             |                    |            |                    |
| 0-4                                        | 38.0 | 42.0                                                     | 46.0  | 43.1        | 11.4               | 30         | 39                 |
| 5-9                                        | 48.0 | 55.0                                                     | 61.5  | 55.4        | 10.7               | 35         | 31                 |
| 10-14                                      | 55.1 | 60.0                                                     | 64.0  | 60.1        | 9.3                | 39         | 21                 |
| 15-19                                      | 51.0 | 65.0                                                     | 77.5  | 66.6        | 17.9               | 43         | 20                 |
| 20 +                                       | 66.0 | 73.0                                                     | 90.0  | 78.0        | 18.6               | 55         | 34                 |
| <b>Applied Research</b>                    |      |                                                          |       |             |                    |            |                    |
| 0-4                                        | 40.0 | 44.3                                                     | 48.0  | 43.9        | 6.0                | 32         | 77                 |
| 5-9                                        | 48.0 | 51.0                                                     | 56.0  | 52.4        | 8.7                | 36         | 106                |
| 10-14                                      | 48.5 | 57.4                                                     | 63.0  | 57.8        | 13.6               | 41         | 80                 |
| 15-19                                      | 52.5 | 59.0                                                     | 70.0  | 62.6        | 16.5               | 45         | 58                 |
| 20 +                                       | 57.6 | 65.7                                                     | 75.1  | 67.0        | 15.2               | 56         | 84                 |
| <b>Development, Design and Engineering</b> |      |                                                          |       |             |                    |            |                    |
| 0-4                                        | 40.0 | 43.2                                                     | 48.0  | 44.3        | 5.6                | 32         | 41                 |
| 5-9                                        | 43.5 | 49.5                                                     | 53.5  | 49.2        | 9.3                | 36         | 58                 |
| 10-14                                      | 50.0 | 56.0                                                     | 61.0  | 57.5        | 9.6                | 40         | 60                 |
| 15-19                                      | 53.5 | 62.0                                                     | 71.0  | 63.0        | 14.0               | 46         | 46                 |
| 20 +                                       | 51.8 | 60.0                                                     | 72.9  | 65.9        | 24.6               | 55         | 59                 |
| <b>Administration</b>                      |      |                                                          |       |             |                    |            |                    |
| 0-4                                        | *    | *                                                        | *     | *           | *                  | *          | 2                  |
| 5-9                                        | 56.7 | 66.5                                                     | 75.0  | 67.2        | 16.9               | 36         | 18                 |
| 10-14                                      | *    | *                                                        | *     | *           | *                  | *          | 15                 |
| 15-19                                      | 60.0 | 73.3                                                     | 84.5  | 72.6        | 18.3               | 45         | 37                 |
| 20 +                                       | 70.8 | 86.0                                                     | 107.0 | 91.7        | 29.9               | 55         | 58                 |

\*Number of respondents was too small to calculate reliable statistics.

## SALARIES AND PRIMARY WORK ACTIVITY

- Median starting salaries in industry are relatively consistent across work activities. The typical salary range for industrially employed PhDs with less than 4 years of experience was \$40-48,000.
- PhDs engaged in non-administrative activities earn comparable salaries throughout most of their careers. However, those few scientists who are still engaged in basic research after 20 years appear to be making somewhat more

than their colleagues doing applied work.

- Individuals in industry typically move into administration later in their careers; 45% of all PhDs who are primarily engaged in administration have 20 and more years of experience. Those individuals who shift into administration earn substantially more than their colleagues outside of administration.

Table 18. 1986 industrial salaries by sex and years from degree, PhDs.

|                   | Median Salary<br>(in thousands of dollars) | Standard Deviation | Median Age | Total Number Known |
|-------------------|--------------------------------------------|--------------------|------------|--------------------|
| YEARS FROM DEGREE |                                            |                    |            |                    |
| 0-6               |                                            |                    |            |                    |
| Male              | 45.9                                       | 9.9                | 33         | 240                |
| Female            | 41.0                                       | 6.2                | 32         | 26                 |
| 7+                |                                            |                    |            |                    |
| Male              | 60.5                                       | 20.1               | 46         | 749                |
| Female            | 52.0                                       | 19.1               | 39         | 26                 |

Table 19. 1986 academic salaries by sex and years from degree, PhDs.

|                   | Median Salary<br>(in thousands of dollars) | Standard Deviation | Median Age | Total Number Known |
|-------------------|--------------------------------------------|--------------------|------------|--------------------|
| YEARS FROM DEGREE |                                            |                    |            |                    |
| 0-6               |                                            |                    |            |                    |
| Male              | 27.3                                       | 7.8                | 33         | 252                |
| Female            | 26.0                                       | 5.8                | 33         | 31                 |
| 7+                |                                            |                    |            |                    |
| Male              | 44.5                                       | 15.3               | 49         | 1255               |
| Female            | 40.0                                       | 14.8               | 47         | 66                 |

## PhD SALARIES FOR MALES AND FEMALES

● Men with PhDs holding entry-level positions in universities and 4-year colleges receive salaries that are 5% higher than their colleagues who are women. This salary difference seems to get larger for more experienced faculty for two reasons. First, the women, as a group, are somewhat younger and thus have somewhat less experience. Second, there is some evidence that women do not get promoted with the same rapidity as their male colleagues of comparable experience.

● Females, who are employed in industry, with PhDs for six or fewer years earn about 10% less than males. This salary difference appears to increase for more experienced workers in part because women are less likely than men to get into the highest paid administrative positions.

● Fewer than 1 in 30 PhDs working in industry with seven or more years of experience are female. This reflects the fact that prior to the 1980s women were unlikely to be employed in industry.

## APPENDIX A: GEOGRAPHIC DIVISIONS

### NEW ENGLAND

Connecticut  
Maine  
Massachusetts  
New Hampshire  
Rhode Island  
Vermont

### MIDDLE ATLANTIC

New Jersey  
New York  
Pennsylvania

### SOUTH ATLANTIC

Delaware  
District of Columbia  
Florida  
Georgia  
Maryland  
North Carolina  
South Carolina  
Virginia  
West Virginia  
Puerto Rico

### EAST NORTH CENTRAL

Illinois  
Indiana  
Michigan  
Ohio  
Wisconsin

### EAST SOUTH CENTRAL

Alabama  
Kentucky  
Mississippi  
Tennessee

### WEST NORTH CENTRAL

Iowa  
Kansas  
Minnesota  
Missouri  
Nebraska  
North Dakota  
South Dakota

### WEST SOUTH CENTRAL

Arkansas  
Louisiana  
Oklahoma  
Texas

### MOUNTAIN

Arizona  
Colorado  
Idaho  
Montana  
Nevada  
New Mexico  
Utah  
Wyoming

### PACIFIC

Alaska  
California  
Hawaii  
Oregon  
Washington

## APPENDIX B: TECHNICAL NOTES

### Median

The median, a measure that is frequently used in this report, is that point in a distribution above and below which 50% of the values fall. Since it is less influenced by extreme values than the arithmetic mean, it is the preferred descriptive measure of central tendency in typically skewed salary and age distributions. In most of the tables, both median and mean salaries are presented; observed differences reflect the skewness in the distributions.

### Quantile Calculations

The P-STAT statistical package was used to compute the medians and other quantiles presented in the salary tables and figures. Percentiles were not interpolated when the requested quantiles fell a certain fraction into a group of equal values or when fractional weights were used.

## Quantiles and Interquantile Ranges

Ninety percent of the values in a distribution fall below the ninth decile, seventy-five percent below the third quartile, twenty-five percent below the first quartile and ten percent below the first decile. The interdecile and interquartile ranges, which indicate differences between deciles and between quartiles, are measures of variation within distributions and are used in several of this report's figures.

## Employment Base

Salary data are presented for current society members who are employed full-time in the U.S. Some separate but limited information on Canadian residents is also provided. Students are not included.

## Sampling Error

The salary figures in this report may be affected by different sources of error. Society members who did not respond may have had somewhat different salaries than those who did respond, thus introducing response bias. Although earlier surveys in this series estimated that the effects of response bias were minor, the possible effect remains. A fuller explanation of response bias is presented in the methodological appendices of the membership profiles.

Since the data in this report are based upon a small random sample, they are also subject to sampling error. The variability introduced by the sampling procedure depends both on the size of the sub-group being examined, and the variation of values in the population. The formulas below present conservative estimates of the standard error based on simple random sampling. When standard errors were calculated, taking into account the minor stratification by society used in the sampling, slightly lower estimates resulted. Confidence intervals for proportions, means and medians can be determined as follows:

### Means:

$\bar{x} \pm Zs/(n)^{1/2}$ , where

$\bar{x}$  = the arithmetic mean,

$s$  = standard deviation,

$n$  = sample size, and

$Z$  = coefficient of confidence 1.96 at the 95% confidence level.

### Medians:

$M_1$ , that point below which  $p_1^{\text{th}}$  values fall,

$M_2$ , that point below which  $p_2^{\text{th}}$  values fall,

where

$$p_1 = p + Z \left( \frac{p(1-p)}{n} \right)^{1/2}, p_2 = p - Z \left( \frac{p(1-p)}{n} \right)^{1/2},$$

and

$p = 0.5$ ,

$n$  = sample size,

$Z$  = coefficient of confidence, 1.96 at the 95% confidence level.

### Proportions:

$$p \pm Z \left( \frac{p(1-p)}{n} \right)^{1/2}$$

$p$  = sample proportion observed.

$n$  = sample size, and

$Z$  = coefficient of confidence, 1.96 at the 95% confidence level.

## Cost of Living Index

The cost of living index used in this report was developed by the American Chamber of Commerce Researchers' Association (ACCRA). Its purpose is to provide "a useful and reasonably accurate measurement of inter-city cost of living differences." The index measures "relative price levels for consumer goods and services in participating cities, as compared with the national average for all participating cities (metropolitan and nonmetropolitan)." Differences of more than three index whole numbers in the All-items index can be considered to represent actual inter-city differences in the cost of consumer goods and services; but the percentage difference in such cases should be considered a reasonable indication, rather than a precise measure, of the extent of the differences.